FLIES OF THE ANTHOMYIID GENUS PHAONIA ROBINEAU-DESVOIDY AND RELATED GENERA, KNOWN TO OCCUR IN NORTH AMERICA

BY J. R. MALLOCH

The present paper offers a revision of the species of the genus *Phaonia* in its widest sense, not with the idea that this is by any means a complete survey of our species, because there must be a large number still unknown to me, but with the intention of making it possible for students of this imperfectly known family to identify those species which have already been described, and to place before those students data bearing on characters which I have found valuable in the differentiation of the species. To this family, more so than to most dipterous groups, there has been shown an aversion by students, because of the fact that the generic limits and the characters for the definition of the genera have been but imperfectly understood. There is no good key for the identification of the genera, though a recent one by Herr P. Stein is a considerable advance in our knowledge.[1]

In several of my recent papers on different genera of the family I have given partial keys to the genera and intend finally to publish a key to the whole of the genera, but my material is not sufficient to warrant such a course at this time. I include in this paper a partial key to the genera related to *Phaonia* in the restricted sense, in the hope that it may permit of the more ready recognition of the forms treated in the paper.

Much of the material on which this paper is based belongs to the United States National Museum, but many specimens were lent to me by Mr. C. W. Johnson from his collection or that of the Boston Society of Natural History, and by Professor J. S. Hine from his own collection or from the material collected by him when on his trips to Mt. Katmai for the National Geographic Society. The collection of the Illinois State Natural History Society has always been available to me, and most of that material was collected by the late Mr. C. A. Hart and the author.

[1] Archiv. für Naturges., 1917, Abt. A, 1 heft, 1919.

Every effort has been made to place types or paratypes in the National collection at Washington, and the types of all new species belonging to the United States Bureau of Biological Survey will be deposited in that collection. A representative series has also been placed in the collection of the American Entomological Society.

Definition of the Group

Sixth wing-vein not reaching the margin of wing; hind tibia with one bristle, rarely two bristles, on posterodorsal surface; cheek without a slightly raised anteriorly rounded area on lower half or more, the surface of which is covered with more or less upwardly curved hairs, lower calyptra always distinctly protruded beyond upper; under surface of scutellum never with soft hairs; propleura bare; sternopleural bristles not in an equilateral triangle; thorax with at least two strong presutural dorsocentral bristles.

There are one or two species of the genus *Helina* R.–D. which may be confused with this group, but the partial key offered herewith should enable students to place any questionable forms in their proper positions.

Habits of the Species

The larvae of the species are mostly unknown. Those that are known to me are dealt with in the text. One has been found to parasitize the larvae or pupae of a tipulid fly, while one lives in much decayed tree stumps and another under the bark of recently felled trees.

The adults of many species occur on tree trunks or on leaves and are very active. They feed on sap exuding from wounds in trees and on nectar of flowers.

Many of the species occur in the far north and in mountainous regions, while very few are met with in the Plains states. Those I have found in Illinois are associated with wooded areas and are neither plentiful in numbers nor species.

Some species are common to Europe and North America, but in all cases where the recognition of European species as American has been recorded, I have had authentically identified European specimens for comparison with those from this country. This has been considered as essential because of the great similarity in color and general structure in this genus, and the fact that

many very useful characters for the differentiation of closely allied species are used in this paper for the first time. The lack of recognition of these characters by European workers causes a doubt to arise, as to the propriety of arbitrarily deciding whether or not a species should be placed in one or other of the categories in the key, when the character which I use is not mentioned in any available description.

Descriptive Terminology

In the keys and descriptions in this paper I have utilized the characters and terminology used in my most recent papers on the family. The names designating the various leg surfaces have been adopted from the paper written on the chaetotaxy of Cyclorrhapha by P. H. Grimshaw, which appeared in the Entomologists' Monthly Magazine in 1901. That paper was considered by the author at the time of its appearance as the first on the subject, but some years afterwards he informed me that he was in error in so considering it, as the method indicated for the leg surfaces at least had been used or suggested by a continental European author some years before.

In using the system referred to, the legs are assumed to be viewed when at right angles to the body, thus causing the same surfaces of all of them to lie in the same position and to receive the same names. There has been considerable confusion arising from the fact that it has not always been possible to determine whether an author meant what I call the ventral, or the posterior surface of the tibia when he referred to the inner side. The inner side may be in the terminology of one writer that side which lies next to the body, while in that of another it may apply to the surface which is opposed to the ventral or under side of the femur. A terminology which is essentially the same for all legs is indispensible for correct descriptions, especially in dealing with species which are as closely allied as are those in this family, and in all my papers the one now used has been adopted. I do not hold that it is a perfect system, but it is the only one which is thoroughly descriptive and not cumbersome in terminology, a fact which leads me to believe that it will come into more general use as the Muscaridae and Tachinidae find more students.

Dipterists who have carefully studied the legs of the species realize that there are more than four surfaces to the tibiae. Ordinarily one finds but four in descriptions of Muscaridae, upper, under, inner, and outer. These correspond, at least on the mid and hind legs, to those designated in my papers as dorsal, ventral, posterior, and anterior respectively. There are as a matter of fact very few strong bristles found on any of the four surfaces mentioned except at apices of the tibiae, the outstanding bristles being almost invariably situated on the other four surfaces which are between those listed and are termed the anteroventral, anterodorsal, posteroventral, and posterodorsal. The names are self explanatory.

A close examination of the hind tibia of *Phaonia errans* Meigen shows that the "calcar" so called is situated less than one-third of the tibial length from apex and on the posterodorsal surface, there are two bristles on the anterodorsal surface, and two or more on the anteroventral. The setulae on the median portions of the anterior and posterior surfaces are rather strong, but the dorsal and ventral surfaces are devoid of bristles or outstanding setulae. The names used in designating the surfaces of the tibiae apply also to the femora.

The thoracic chaetotaxy and the names applied to the bristles, and the regions where they are situated, are used in any book or paper on the Cyclorrhapha, are familiar to students the world over and require no elucidation except in a few cases. Recent attempts to separate the Muscaridae from the Anthomyiidae have not been entirely satisfactory, and in my opinion there are so many overlapping groups, genera, and species that it cannot be done, at least for the world's fauna. The most recent characters cited give to the Muscaridae (Muscidae auct.) hairs on either the hypopleura or pteropleura or both, while the Anthomyiidae have those sclerites bare. As a matter of fact there are many species that are very obviously anthomyiine in their affinities, which have hairs on either or both of the pleural sclerites, referred to not only in Phaoniinae, which are in my opinion most closely allied to the group containing *Musca*, but also in the Anthomyiinae. I have no hesitation in linking the two groups under the same family name, Muscaridae.

In the group treated in this paper I use the pleural characters just cited as of specific value, though in a few cases I am inclined to believe that they do not even admit of that interpretation.

There are some minor characters which I have introduced in the present paper, such as the structure and hairing of the fore tarsus, and especially that of the basal segment. The presence or absence of fine hairs adjacent to the bases of the notopleural bristles has some value as a character for the differentiation of species and even groups, but whether it is possible to use it successfully for species from a larger faunal area than is included in this paper I am unable to say.

In but few cases are there hairs on the prosternum in North American Phaoniinae, only one or two such occurring within the group under consideration, but many African and other exotic forms have hairs on this part of the thorax, as do all the species of the genus *Limnophora* R.–D., which is of cosmopolitan occurrence.

A few genera of Phaoniinae have the declivitous posterolateral portion of the mesonotum, caudad of wing base and extending to anterior margin of scutellum, with setulose hairs. I have found this character present in some Sarcophagidae and allied groups, and in a few exotic Phaoniinae.

There is very little variation in the wing-venation in Phaoniinae, though in a few cases the fourth vein is curved more or less forward. In no case is it angularly bent as in *Musca* and allied genera.

The hypopygia of closely allied species in Phaoniinae are usually very similar and, as a study of these would entail the expenditure of too much time and the number of species available now is far from the total of those occurring in this country, I have not attempted to use this character in the present paper.

Key to Genera and Subgenera

1. The declivitous portion of mesonotum immediately in front of scutellum and above calyptrae with some hairs in center; first and third wing-veins setulose 2

— The declivitous portion of mesonotum in front of scutellum and above calyptrae bare; at least the first wing-vein bare 4

2. Prosternum bare; the bristle on posterodorsal surface of hind tibia (calcar) at or near middle of tibia. . . . . **Steinella** Malloch
— Prosternum hairy; calcar about one-third of the tibial length from apex of hind tibia. 3
3. Fourth wing-vein not curved forward at apex. . . . . **Smithomyia** Malloch
— Fourth wing-vein curved forward at apex. . . . . **Poecilophaonia** Malloch
4. Pteropleura with many fine erect hairs in center. 5
— Pteropleura bare 6
5. Prosternum hairy. . . . . **Polietes** Rondani
— Prosternum bare. . . . . **Pseudophaonia** Malloch
6. Fourth wing-vein curved forward at apex; third vein setulose at base both above and below. . . . . **Bigotomyia** Malloch
— Fourth wing-vein not or almost imperceptibly curved forward at apex; third vein not setulose on both sides at base. 7
7. Cheek in male with one or two very strong upwardly curved bristles on lower margin just below anterior margin of eye in both sexes; frons in female with the anterior supraorbital bristle very strong and directed forward, the interfrontalia with or without a pair of cruciate bristles. **Dendrophaonia** new genus
— Cheek in both sexes without strong upwardly curved bristles as above, sometimes with some upwardly curved fine hairs or setulae; lower supraorbital bristle weak or absent, if present not directed forward. . 8
8. Hypopleura with some fine hairs on upper margin in front of spiracle; prealar bristle very long; fore tarsus with some long fine sensory hairs along the posterior or posteroventral side of basal segment; eyes distinctly hairy; presutural acrostichals not strong; third wing-vein bare. **Phaonia** R.–D. sen. str.
— Third wing-vein setulose at base below; thorax with some well developed presutural acrostichals; hypopleura with some weak hairs on upper margin in front of spiracle. . . . . subgenus **Rohrella** R.–D.
— Third wing-vein bare at base or the other characters not as above. 9
9. Fore tarsus in both sexes with the segments short and stout, the basal one densely hairy, the hairs erect, no long sensory hairs along posterior side; hypopleura hairy on upper margin in front of spiracle. **Phaonia** (group **serva**)
— Fore tarsus not as above, generally slender and with or without fine sensory hairs along posterior side; hypopleura hairy or bare. 10
10. Hypopleura usually with a few fine hairs below spiracle; presutural acrostichal bristles well developed. . . . . Subgenus **Euphemia** R.–D.
— Hypopleura bare; presutural acrostichals strong; female with a strong pair of cruciate bristles; metallic blue species. . . . . **Euphaonia** Malloch
— Hypopleura bare; presutural acrostichals poorly developed. 11
11. Arista with very distinct hairs; legs largely yellowish. **Phaonia** (group **fusca**)
— Arista almost bare, the hairs very seldom as long as basal diameter of arista; legs black. . . . . **Phaonia** (group **minima**)

It should be noted that several groups in *Phaonia* have been separated from that genus by European authors, and that a few of these are included in the above key. Those so listed are not in all cases so well distinguished as to deserve generic rank, but there is no doubt in my mind that with the growth of our knowledge of the genus and its allies some further division is inevitable.

I have endeavored to obtain the genotypes of the segregates above referred to, and the characters for *Euphemia* and *Rohrella*, as well as the segregates accepted as of generic value, have been attributed to them from an examination of the genotypes and allied species.

In the key to *Phaonia*, presented herewith, I have included all segregates of *Phaonia* which are not in my opinion sufficiently well differentiated from the true species of that genus to warrant their being placed in different genera.

STEINELLA Malloch

This genus is known to me only from South America and is represented solely by the genotype, *prima* Malloch.

SMITHOMYIA Malloch

Generic characters.—Differs from *Poecilophaonia* Malloch, which it most closely resembles, in having the fourth wing-vein bent forward at apex.

The first wing-vein is setulose above only, the third is setulose from base to near apex above and from base to near inner cross-vein below. The frons in female has the lower supra-orbital bristle strong and directed forward as in *Dendrophaonia*, and the interfrontalia with a pair of cruciate bristles. The prosternum and center of pteropleura are hairy, and there are some black hairs along the posterior margin of the metathoracic spiracle and some weaker hairs on lower posterior angle of hypopleura.

The only species of the genus, *concinna* Van der Wulp, occurs in Mexico and may yet be found in the southwestern United States.

POECILOPHAONIA Malloch

In my description of this genus I erroneously stated that the third vein is bent forward. It is the fourth vein that is thus bent.

This genus is known to me only from South America. The genotype is *flavithorax* (Stein), but there are some other species from South America which are referable to the genus.

Both this and the preceding genus have a bristle between the notopleurals, and the third vein setulose below beyond the inner cross-vein. It may be necessary to unite the genera if the females have the orbital bristling identical.

PSEUDOPHAONIA Malloch

Generic characters.—Similar to *Phaonia* sens. str. in having the eyes hairy, prealar bristle long, hind tibial calcar present, third wing-vein bare at base, and fourth vein not curved forward at apex. Differs in having the pteropleura with numerous long erect hairs in center, and the hypopleura bare.

Genotype, *Pseudophaonia orichalcea* (Stein) Malloch.

Synopsis of Species

Both sexes with the fourth abdominal tergite golden pollinose; hind femur of male bare on ventral surface, the posteroventral surface with some fine erect hairs on basal half and a few bristly hairs at apex; narrowest part of frons decidedly wider than third antennal segment; mid tibia with ten to twelve posterodorsal and posteroventral bristles.....**orichalcea** (Stein)

Male with gray pruinosity on fourth as well as preceding tergites, female unknown, but undoubtedly as male in this respect; hind femur of male with moderately long erect fine hairs on entire length of ventral and posteroventral surfaces; narrowest part of frons not as wide as third antennal segment; mid tibia with about eight posterodorsal and three posteroventral bristles.....**griseocaerulea** new species

Pseudophaonia orichalcea (Stein)

Aricia orichalcea Stein, Berl. Ent. Zeitschr., 1897, p. 186.

Male and female.—Shining blackish blue, or black with a bluish tinge, rather densely grayish pruinescent. Frons opaque black, orbits, parafacials, face, and anterior third and the narrow upper margin of cheeks with golden pollinosity; antennae and palpi black. Thorax distinctly quadrivittate. Abdomen with a slender dorsocentral vitta and lateral checkerings black, the basal three tergites gray pruinescent, the fourth golden pollinose. Legs black. Wings slightly grayish. Calyptrae white, with black hairs at outer angle of upper calyptra. Halteres black in male, brown in female.

Male.—Eyes not densely, but distinctly hairy; frontal orbits narrow, bristled on their entire length, the two uppermost bristles on each orbit directed backward, some fine hairs along the inner side of orbits on upper half or more; arista plumose; cheek somewhat similar to that of species of the

genus *Pogonomyia*, the surface largely hairy (fig. 4). Thorax with four pairs of presutural acrostichals, and four pairs of postsutural dorsocentrals; sternopleurals 1 : 2. Abdomen elongate ovate; basal sternite bare; fifth sternite slightly emarginate at apex. Fore tibia with one or two weak median posterior bristles; fore tarsus stout, not longer than tibia, with sensory hairs as in *Phaonia errans* Meigen; mid femur with fine hairs on ventral surfaces; hind femur with a series of long bristles on anteroventral surface; hind tibia with a series of rather closely placed bristles on anteroventral surface, the anterodorsal surface with some outstanding setulae but no strong bristles, calcar long, and basad of it some erect setulae, the apex with three straight, strong, blunt-tipped spines on ventral surface, which are of the same length and longer than in allied species.

Female.—Frons over one-third of the head-width; each orbit with the anterior and sometimes the next supra-orbital bristle directed forward; cruciate bristles present but weak. Sternopleurals 1 : 3 or 1 : 4. Genitalia without thorns. Fore tibia with two or three anterodorsal bristles; mid femur with some bristles on basal half of anteroventral and posteroventral surfaces; mid tibia with but one posteroventral bristle; hind tibia with two or three anterodorsal and four or five anteroventral bristles.

Length, 8 to 9 mm.

Originally described from Craig's Mountain, Idaho. I have the type male before me now. I also have before me a male from Sherborn, Massachusetts, May 12, and a female from King and Bartlett Lake, Maine, August, 1895, sent to me by Mr. C. W. Johnson.

Pseudophaonia griseocaerulea new species

Male.—Similar in color to *orichalcea*, differing in having the fourth abdominal tergite colored as are the others, and the calyptrae and their fringes yellow.

In addition to the characters listed in the synopsis for separating it from the preceding species I may enumerate the following: the orbits are less strongly bristled, only one weak upper orbital is directed backward (fig. 5), and the orbital hairs are in line with the bristles instead of mesad of them; the basal abdominal sternite is hairy; the hind tibia has fewer and longer anteroventral bristles, the anterodorsal setulae are stronger and one at least assumes the proportions of a bristle, the posterior and posteroventral surfaces are furnished with long hairs, and the apical ventral bristles are not of uniform length and strength, only one being really long.

Length, 8.25 mm.

Type locality illegible on label, New Hampshire, August 27, 1912. *Solidago* flowers. The type bears also a label with the inscription "T. D. 4335," [U. S. N. M.].

BIGOTOMYIA Malloch

Generic characters.—Differs from *Phaonia* in having the fourth vein distinctly bent forward at apex, and the third with some setulose hairs at base.

Genotype, *Bigotomyia trispila* (Bigot).

Key to Species

1. Basal abdominal sternite with some setulose hairs: abdomen with a dorsal vitta and lateral checkerings black.....**californensis** new species
— Basal abdominal sternite bare; abdomen with only a blackish dorsocentral vitta, without lateral checkerings.....2
2. Humeri black; eyes of male separated by width across posterior ocelli. **houghi** Stein
— Humeri yellowish testaceous; eyes of male separated by much less than width across posterior ocelli.....**houghi** Stein variety

Bigotomyia houghi (Stein)

Aricia houghi Stein, Berl. Ent. Zeitschr., 1897, p. 177.

Differs from *californiensis* in having the legs entirely yellow.

Structurally similar to that species. Differs in having the hypopleura usually with a few hairs below spiracle and some on margin of spiracle at center; four or five anteroventral bristles on hind tibia; and the fourth wing-vein less noticeably curved forward at apex.

Length, 8 to 9 mm.

One of the commonest species of the genus, occurring in Canada, from Washington to Maine and as far south as middle California and Florida.

Bigotomyia californiensis new species

Male.—Black, very distinctly gray pruinescent. Second antennal joint, base of third, and the palpi ferruginous. Scutellum rufous, more or less blackened at base. Legs reddish yellow, coxae, almost all of fore femora, bases of mid and hind femora, and the entire tarsi black. Calyptrae whitish yellow. Halteres yellow.

Eyes long haired, separated at narrowest part of frons by less than width across posterior ocelli; longest hairs of arista much longer than width of third antennal joint; parafacial in profile a little broader than third antennal joint and about one-third as wide as height of cheek, the latter with numerous bristles which occupy a large portion of its surface, almost all of it posteriorly; bristles ascending facial ridge much above the vibrissa. Presutural acrostichal bristles absent; postsutural dorso-centrals 4; prealar bristle long; sternopleurals 1 : 2. Abdomen broadly ovate. Fore tibia without median bristle; mid femur with five or six strong bristles on basal half of posteroventral surface; mid tibia with two or three posterior bristles; hind femur

with a complete series of antero-ventral bristles; hind tibia with two antero-ventral and two antero-dorsal bristles, the calcar short. Costal thorn very small.

Female.—Similar in color to the male. Only the fore femora with the bases blackened.

Eyes less conspicuously haired than in male, separated at frons by one-third the width of head, at base of antennae by about three-fifths the width of head; orbits with numerous short setulose hairs in addition to the bristles. In other respects as the male.

Length, 8 to 9 mm.

Type (male), allotype, and several paratypes, San Antonio Canyon, California, July 25, 1907, (Hine), [Ohio University]. Paratypes, one female, Hilton, one female, Mount Lowe, one female, Mount Wilson, and one female, Pasadena, California. The last specimen is in the collection of the California Academy of Sciences, and the preceding three in the U. S. National Museum.

DENDROPHAONIA new genus

Generic characters.—Closely related to *Euphemia*, having distinct presutural acrostichal bristles, and the male orbits with bristles on the entire length from base of antennae to anterior ocellus. It differs, however, in having the cheek below anterior margin of eye with one or two long strong bristles which are upwardly curved (figs. 6, 7), and the lower supra-orbital bristle in female very strong and forwardly directed. The notopleural bristles are not surrounded with hairs, and the anterior intra-alar bristle is strong and almost in transverse line with the strong supra-alar. The hind tibia in both sexes has one or more bristles basad of the calcar and usually a series of long and short bristles on anterodorsal surface.

Genotype, *Spilogaster hilariformis* Stein.

Key to Species

1. Thorax with four pairs of postsutural dorsocentrals; hypopleura with some hairs on upper margin in front of spiracle; hind femur of male with a stout bristle near middle on posteroventral surface (fig. 20).
querceti Bouché

— Thorax with three pairs of postsutural dorsocentrals; hypopleura bare; hind femur of male with a few very short setulae on basal two-thirds (fig. 19) ..... **hilariformis** Stein

Dendrophaonia querceti (Bouché)

Anthomyia querceti Bouché, Naturgesch. d. Ins., 1, p. 82, 1834.

I have seen only one male of this species from America, taken at White Heath, Illinois.

I have a female taken at Gold Rock, Ontario, Canada, which may belong to a different species, having the hypopleura bare and the hind tibia with only the calcar on that surface, but do not describe it as I have insufficient material to warrant that course.

Dendrophaonia hilariformis (Stein)

Spilogaster hilariformis Stein, Berl. Ent. Zeitschr., 1897, p. 196.

This species is very common on tree trunks at Urbana, Illinois, but it is so alert that it is difficult to catch. I reared a series of specimens from larvae found feeding in a much decayed tree stump, in March 1915, at Urbana.

The adults habitually frequent the trunks of trees and sit normally head downwards, harmonising well with the bark and are very wary. The species is well distributed throughout the eastern United States, occurring as far south as Plummer's Island, Maryland, to my knowledge, but is rare in collections, possibly because of its habits.

The larva has six or seven branches to each prothoracic respiratory organ. These are very distinct in the puparium, being white, and are larger than those of *Phaonia harti*. The cephalic extremity of the puparium has many concentric ridges surrounding the mouth-opening. Metathoracic spiracles pedunculate, about four times as high as thick. Surface of puparium more distinctly striate than that of *harti* and the elevated points on the ventral transverse band larger. On each side of the anal opening in puparium there is a small circular button-like mark. Anal spiracles slightly elevated, their vertical length greater than their horizontal, the distance between them equal to their greatest length. Spiracular slits not radiating, each directed upward and outward, the central button distinct.

The larvae may be predaceous but I have no evidence of this. They were found along with the larvae of *Neodexiopsis basalis* (Stein) and evinced no predaceous tendencies in the breeding dish.

PHAONIA Robineau-Desvoidy

This genus as now limited contains species which have a strong bristle beyond middle on posterodorsal surface of hind tibia; the fourth wing-vein not or almost imperceptibly bent forward apically; third vein not setulose at base, or rarely so on under surface only; pteropleura bare; prosternum bare; cheek with or without fine hairs, or setulose above lower margin, never with one or two strong bristles below anterior margin of eye and near or on lower margin of cheek; female never with the lower supra-orbital bristle strong and forwardly directed; thorax with two strong presutural dorsocentrals.

Genotype, *Musca erratica* Fallen.

As previously stated and exemplified in the key to genera and subgenera in this paper, there are several groups in this genus, most of which are segregated in the following key to species. But there are many intermediate forms which cannot be definitely placed in any of the larger groups, so rather than add to the difficulty in identifying these by creating a multiplicity of genera based on a variable number of characters, I have followed the course of leaving them all in one composite genus until such time as our knowledge of the species and their habits warrants a further segregation. Should it be deemed necessary at any future time to erect genera for any of these segregates, consideration will have to be given to the genera proposed by the older European authors, which are at this time listed as synonyms of *Phaonia*.

Key to Species

1. Hypopleura with some fine hairs on upper margin in front of spiracle; eyes usually with distinct hairs 2
— Hypopleura bare on upper margin in front of spiracle 30
2. Legs entirely black, only the knees more or less reddish, sometimes the hind tibiae reddish when held up to the light 3
— Legs with at least the tibiae reddish yellow 16
3. Thorax with one or more pairs of strong outstanding presutural acrostichal bristles 4
— Thorax without strong outstanding presutural acrostichal bristles, with fine hairs only 10
4. Fore tibia without any strong posterior median bristles 5
— Fore tibia with one or more strong median posterior bristles 8

5. Vibrissal angle very much produced beyond a vertical line drawn from base of antennae (fig. 8); thorax with four pairs of postsutural dorsocentral bristles and one or two pairs of long presutural acrostichals. **protuberans** new species

— Vibrissal angle produced but little beyond a vertical line drawn from base of antennae (fig. 9) 6

6. At least the abdomen bluish black; margins of calyptrae much darker than their discs, dark brown or fuscous ..... **caerulescens** Stein

— Abdomen and thorax both black; margins of calyptrae yellowish 7

7. Neither sex with a distinct median posterior bristle on fore tibia; base of wing conspicuously yellow; neither sex with anterodorsal bristles on mid tibia ..... **serva** Fallén

— Female with one or two bristles on anterodorsal surface of both fore and mid tibiae; base of wing not conspicuously yellow. **savonoskii** new species

8. Margins of calyptrae brownish or blackish, much darker than their discs; bluish black species; both notopleurals surrounded with fine hairs. **caerulescens** Stein

— Margins of calyptrae yellowish 9

9. Thorax with four pairs of postsutural dorsocentral bristles; only the posterior notopleural bristle surrounded with fine hairs. **protuberans** new species, female

— Thorax with three pairs of postsutural dorsocentral bristles. **versicolor** Stein[2]

10. Hind tibia with a strong outstanding bristle near base on posterodorsal surface; fore tibia without short dense hairs on ventral surface. **basiseta** Malloch

— Hind tibia with only the calcar on posterodorsal surface, which is situated about one-fourth from apex, or the fore tibia has short dense hairs on ventral surface 11

11. Fore tarsus without any long outstanding fine sensory hairs along the posterior or posteroventral margins of basal segment, even the one at apex short and setulose when present, the entire surface with dense short hairs which are sometimes curled at apices as if singed 12

— Fore tarsus with several long fine outstanding sensory hairs along the posteroventral margin of basal segment, the length of which is usually greater than the diameter of the segment, or the segment has the short hairs rather sparse and subdecumbent and not curled at apices 14

12. Fore tibia without any strong bristles or long outstanding hairs on the posterior or posteroventral surfaces ..... **consobrina** Zetterstedt

— Fore tibia with one or more bristles or outstanding setulose hairs on posterior or posteroventral surfaces 12a

12a. Mid tibia without any anterodorsal bristles; fore tibia with a very fine long setulose hair on posteroventral surface; hind femur with some long bristles on basal half of posteroventral surface ..... **incerta** new species

— Mid tibia with one or more anterodorsal bristles; fore tibia with one or two outstanding hairs or bristles 13

[2] I have not seen this species.

13. Fore tibia with dense erect setulose hairs on ventral surfaces except on basal third, the length of which is about as great as the diameter of the tibia; hind femur without long bristles on basal half of posteroventral surface, usually with very short bristles or setulae.
monticola Malloch
— Fore tibia without such hairs; hind femur with some long bristles on basal half of posteroventral surface.....**brunneinervis** Stein
14. Thorax with three pairs of postsutural dorsocentral bristles; fore tibia without any posterior median bristles.....**fraterna** new species
— Thorax with four pairs of postsutural dorsocentral bristles.....15
15. Only the posterior notopleural bristle surrounded with fine hairs; basal abdominal sternite bare.....**tipulivora** new species
— Both notopleural bristles surrounded with fine hairs; basal abdominal sternite hairy.....**nigricans** Johannsen
16. Third wing-vein with a few fine hairs at base below; basal segment of fore tarsus with the sensory hairs along posteroventral margin short but distinct; basal abdominal sternite bare.....17
— Third wing-vein bare at base; thorax with two or three pairs of strong presutural acrostichal bristles, and four pairs of postsutural dorsocentrals.....**texensis** new species
— Third wing-vein bare at base; thorax with two pairs of fine presutural acrostichals and three pairs of postsutural dorsocentrals.
pallidula Coquillett
— Third wing-vein bare at base below; species not as above in other respects; thorax without strong presutural acrostichals.....18
17. Thorax with four pairs of postsutural dorsocentral bristles; hypopleura with some microscopic hairs near lower posterior angle; metathoracic spiracle large, without small black hairs on its lower margin at middle.
quieta Stein
— Thorax with three pairs of postsutural dorsocentral bristles; hypopleura without hairs near lower posterior angle; metathoracic spiracle small, with two or three small black hairs on its lower margin at middle.
pulvillata Stein
18. Sensory hairs on posteroventral margin of basal segment of fore tarsus conspicuous[3].....19
— Sensory hairs on posteroventral margin of basal segment of fore tarsus inconspicuous or absent.....26
19. Antennae and palpi, or at least the former partly yellow.....20
— Antennae and palpi black.....23
20. Hind femur with long hairs on almost the entire length of posteroventral surface.....**quieta** Stein
— Hind femur without long hairs on posteroventral surface, sometimes with one or two bristles.....21

[3] I have not seen *perfida* Stein, so place it in both segregates here. I have arbitrarily accepted the hypopleura as hairy above in front of spiracle in this species.

21. Palpi blackened apically; fourth wing-vein slightly curved forward at apex; basal abdominal sternite bare; tarsi black....**erratica** Fallen[4]
— Palpi fuscous; fourth wing-vein not curved forward at apex; third antennal segment black; abdomen with golden pollinosity.
aurea new species
22. Tarsi black; hind femur with at least one bristle on posteroventral surface; humeri black.....**rufibasis** Malloch
— Tarsi yellow; hind femur bare on posteroventral surface; humeri yellowish.
perfida Stein
23. Legs almost or entirely black.....**nigricans** Johannsen
— Legs with at least the tibiae reddish yellow.....24
24. All femora yellowish; mid tarsi with the short spines along the anteroventral and posteroventral margins continued to bases of segments two to four or almost so....**errans** variety **completa** new variety
— At least the fore femora largely or entirely blackish; mid tarsi with the short spines on segments two to four confined to apical halves.....25
25. Fore femora largely and mid femora rarely partly blackened.
errans Meigen
— All femora largely blackened.....**varipes** Coquillett
26. Thorax with three pairs of postsutural dorsocentral bristles; hind femur in male with long setulose hairs on basal half of ventral surfaces and a series of long bristles on apical half of anteroventral.
subfusca new species
— Thorax with four pairs of postsutural dorsocentral bristles; hind femur not as above.....27
27. Hind femur of male with long hairs on almost the entire length of posteroventral surface; antennae and palpi partly black; tarsi black.
quieta Stein
— Hind femur without long hairs on posteroventral surface; antennae and palpi black, if partly yellow the tarsi are black or the fourth tergite of abdomen is partly yellowish apically.....27
28. Eyes not very widely separated, the frons at narrowest part not wider than third antennal segment; tarsi and humeri yellowish; hind tibia with only the calcar on posterodorsal surface.....**perfida** Stein
— Eyes separated at narrowest part of frons by much more than width of third antennal segment; hind tibia with a bristle basad of the calcar on posterodorsal surface.....29
29. Tarsi and apex of fourth abdominal tergite yellowish; hind femur of male with an irregular double series of short black bristles on apical half of posteroventral surface; hind tibia of male with long hairs on posteroventral surface.....**deleta** Stein
— Tarsi and entire body black; hind femur of male without bristles and hind tibia without hairs as above.....**soccata** (Walker)

[4] This species does not occur in this country so far as I am at present aware. It is inserted in the key because it is the genotype of *Phaonia* and to show its relations.

30. Entire insect including legs, antennae, and palpi black.....31
— At least some part of legs, antennae, or palpi yellowish or reddish....40
31. Hind femur of male very much curved, very conspicuously swollen on ventral surface about one-third from apex, the apex of swollen part furnished with a tuft of long downwardly directed bristles, that part of surface from tuft to apex with short stiff hairs; eyes separated by less than width across posterior ocelli.....**frenata** (Holmgren)
— Hind femur straight or but slightly curved and not as above.....32
32. Prealar bristle at least half as long as the one behind it.....33
— Prealar bristle not over one-third as long as the one behind it.....38
33. Thorax with three pairs of dorsocentral bristles.....33a
— Thorax with four pairs of dorsocentral bristles.....34
33a. Arista almost bare; fore tibia with one or two median posterior bristles in female; fore tarsus without fine erect hairs basally.
alticola new species
— Arista plumose; fore tibia in female without posterior median bristle; fore tarsus as above.....**azygos** new species
34. Bases of wings and the calyptrae bright orange yellow.....35
— Bases of wings and calyptrae not bright orange yellow, the latter sometimes pale yellowish.....36
35. Halteres orange yellow; mid and hind femora without conspicuous bristles on ventral surfaces except on anteroventral surface of the latter.
citreibasis Malloch
— Halteres with black knobs; anteroventral and posteroventral surfaces of mid and hind femora with strong bristles, those on posteroventral surface of hind pair not extending to apices..**atrocitrea** new species
36. Frons of male at narrowest part not wider than third antennal segment; calyptrae white, the lower one with the margin fuscous and much darker than the disc; longest hairs on arista distinctly longer than its basal diameter.....**dissimilis** new species
— Frons of male at narrowest part much wider than third antennal segment; calyptrae white or yellowish, the margin of lower one not conspicuously darker than the disc; longest hairs on arista not as long as its basal diameter.....37
37. Calyptrae yellowish; basal abdominal sternite bare; glossy black species; the thorax and abdomen without distinct pruinescence or markings.
imitatrix Malloch
— Calyptrae white; basal abdominal sternite hairy; thorax and abdomen with distinct pruinescence, the former with four black vittae, the latter with a black dorsocentral vitta.....**albocalyptrata** Malloch
38. Hind femur straight, with long fine bristles on entire length of anteroventral and basal half of posteroventral surfaces; calyptrae fuscous; basal abdominal sternite bare.....**fuscisquama** (Van der Wulp)
— Hind femur slightly curved, dilated on apical third and with closely placed bristles from one-third or more of the femoral length to apex on anteroventral and posteroventral surfaces, the bristles becoming longer apically; calyptrae yellowish or whitish; basal abdominal sternite with one or two fine hairs.....39

39. Hind femur with a short stout downwardly directed bristle about one-fourth of the femoral length from apex on the posteroventral surface, in addition to the long fine bristles.....**morrisoni** new species
— Hind femur without a bristle as described above....**minima** Malloch
40. Thorax with well differentiated presutural acrostichal bristles, and four pairs of postsutural dorsocentrals; hypopleura sometimes with a few hairs in middle below spiracle or on upper margin in front of spiracle; sometimes the palpi of the female are dilated and the fourth tergite in same sex is distinctly longer than third.....41
— Thorax without well differentiated presutural acrostichal bristles; if these are moderately well developed there are only three pairs of postsutural dorsocentrals present, or the posterior bristles on mid tibia are not in a single series and the hypopleura is bare.....48
41. Legs, including the coxae and tarsi, entirely yellow; cross-veins of wings not darker than the other veins; fore tarsus with a few outstanding sensory hairs along the posteroventral surface of basal segment; hind femur without long bristles on basal half of posteroventral surface; neither notopleural bristle with hairs at base.**marylandica** new species
— Legs with at least the tarsi black; cross-veins sometimes very conspicuously infuscated 42
42. Cross-veins of wings not at all noticeably darker than the other veins; abdomen with a blackish dorsocentral vitta and no distinct lateral blackish spots or checkerings; abdomen in female in known species with the fourth tergite distinctly longer than the third; hypopleura with usually a few hairs on middle just below spiracle.....43
— Cross-veins of wings very noticeably infuscated; fourth tergite of abdomen in female not elongated.....45
43. Posterior notopleural bristle without fine hairs adjacent to its base. **harti** new species
— Posterior notopleural bristle with some fine hairs adjacent to its base..44
44. Apex of scutellum reddish yellow; presutural acrostichal bristles moderately widely separated, in pairs; frons of female with a pair of interfrontal cruciate bristles.....**striata** Stein
— Apex of scutellum not yellowish, concolorous with disc; presutural acrostichal bristles almost uniserial, not in distinct pairs; frons of female without cruciate interfrontal bristles.....**uniseriata** new species
45. Outer cross-vein of wings straight or very slightly curved; abdomen with a dorsocentral vitta and lateral checkerings black; anteroventral bristles on hind femur short and strong....**brevispina** new species
— Outer cross-vein curved but not conspicuously so; abdomen with a black dorsocentral vitta; anteroventral bristles on hind femur long on apical half, their length exceeding diameter of femur...**fuscicauda** Malloch
— Outer cross-vein of wings very conspicuously curved forward in middle; abdomen with a dorsocentral vitta and lateral spots on each tergite blackish 46

46. Hypopleura usually with a few hairs on upper margin in front of spiracle; all femora largely infuscated basally; palpi rufous yellow.
texensis new species
— Hypopleura without hairs on upper margin in front of spiracle.....47
47. Palpi rufous yellow; hypopleura bare.
texensis variety **flavofemorata** new variety
— Palpi largely or entirely black; hypopleura with some hairs in middle, just below spiracle.....**limbinervis** Stein
48. Thorax with four pairs of postsutural dorsocentral bristles; hind tibia with a strong bristle basad of the calcar on the posterodorsal surface; some fine hairs at bases of both the notopleural bristles; prealar bristle very long.....**aberrans** Malloch
— Thorax with four pairs of postsutural dorsocentral bristles; hind tibia with only the calcar on posterodorsal surface; mid tibia with three or four bristles on posterior surface which are not arranged in a single series; arista pubescent; prealar minute or absent; no hairs at base of notopleurals.....**alaskensis** new species
— Thorax with three pairs of postsutural dorsocentral bristles; hind tibia with a bristle basad of calcar on posterodorsal surface; posterior notopleural bristle with some fine hairs adjacent to its base; hind femur of male with long bristly hairs on all ventral surfaces from base to beyond middle.....**subfusca** new species
— Thorax usually with three pairs of postsutural dorsocentral bristles; hind tibia with only the calcar on posterodorsal surface; usually no hairs at bases of notopleural bristles.....49
49. Thorax entirely, abdomen at least partly yellow.....50
— Thorax and abdomen largely or entirely black.....52
50. Head including antennae and palpi black; abdomen in male glossy black on apical half; eyes of male at narrowest part of frons separated by not more than the width of third antennal segment..**nigricauda** Malloch
— Head, including antennae and palpi, largely or entirely yellow.....51
51. Eyes in male widely separated, the frons one-fourth of the head width; frons in both sexes largely fuscous.....**flava** Stein
— Eyes in male widely separated, the frons one-fourth of the width of head; entire head in both sexes yellow.....**pallida** (Stein)
52. Scutellum partly or entirely yellow, contrasting sharply with disc of mesonotum 53
— Scutellum black, concolorous with disc of mesonotum.....58
53. Basal half of abdomen and the entire scutellum testaceous yellow; prealar bristle very short.....**flavibasis** Malloch
— Abdomen entirely black 54
54. Fourth wing-vein slightly curved forward apically; fore tibia in female with two anterodorsal and two posterior bristles; prealar bristle very long.....**curvinervis** new species
— Fourth wing-vein straight or slightly deflected at apex, not curved forward; fore tibia with or without a median posterior bristle.....55

55. Thorax with a pair of presutural acrostichal bristles; prealar bristle long. **solitaria** Stein
— Thorax without differentiated presutural acrostichal bristles.....56
56. Humeri not paler than adjoining portions of dorsum of thorax. **apicata** Johannsen
— Humeri yellowish testaceous at least in part.....57
57. Prealar bristle not over half as long as the bristle behind it; tarsi black; eyes of male separated by width across posterior ocelli..**bysia** (Walker)
— Prealar bristle over half as long as the one behind it; tarsi yellow; eyes of male separated by more than width across posterior ocelli; longest hairs on arista longer than width of third antennal segment. **winnemanae** Malloch
58. Prealar bristle minute or absent; thorax and abdomen glossy black, with faint gray pruinescence; legs, except tarsi, yellow; hind tibia with two anterodorsal bristles in each sex.....**parviceps** Malloch
— Prealar bristle almost or quite half as long as the bristle behind it....59
59. Hind tibia with two equally long anterodorsal bristles; third wing-vein not setulose at base below; longest hairs on arista not as long as width of third antennal segment; shining black species with distinct but not very dense grayish pruinescence on thorax and abdomen; cross-veins of wings not noticeably infuscated.....60
— Hind tibia either with one anterodorsal bristle or with one long and one very short bristle on that surface; longest hairs on arista distinctly longer than width of third antennal segment except in *prisca* Stein; subopaque black species, with very dense gray pruinescence; third wing-vein sometimes with some weak setulae at base below.....61
60. Third antennal segment in male normal, not abnormally large and broad; fore tibia in male without median posterior bristle; mid tibia with one posterior bristle basad of middle; some fine hairs at base of posterior notopleural bristle.....**trivialis** new species
— Third antennal segment in male very large and broad, not as noticeably so in female; fore and mid tibiae in both sexes with two posterior bristles; no hairs at base of either of the notopleural bristles. **laticornis** new species
61. Hind tibia with the apical posterodorsal bristle as strong and large as the anterodorsal and nearly as large as the dorsal one (fig. 22); mid femur with one bristle basad of middle on posteroventral surface; third vein setulose at base below; cross-veins infuscated. **atlanis** new species
— Hind tibia with the apical posterodorsal bristle much smaller and weaker than the anterodorsal one; mid femur with more than one posteroventral bristle.....62
62. Cross-veins of wings distinctly, often conspicuously, infuscated; third vein often with some weak setulose hairs at base below; hind tibia usually with one long and one very short bristle on anterodorsal surface; hind femur without distinct bristles on posteroventral surface. **fusca** Stein

— Wing without distinct infuscation on cross-veins; third vein bare at base; hind tibia with one strong anterodorsal bristle; hind femur in both sexes with distinct bristles on posteroventral surface.....63

63. Tarsi black; hind femur with some moderately long strong bristles on basal two-thirds of posteroventral surface; longest hairs on arista at least as long as width of third antennal segment; interfrontalia not interrupted.....**diruta** Stein

— Tarsi yellow; hind femur with fine bristles on almost the entire length of posteroventral surface; longest hairs on arista shorter than width of third antennal segment; interfrontalia interrupted above middle.

prisca Stein

Phaonia protuberans new species

Male and Female.—Black, distinctly shining, with rather dense whitish pruinescence. Thorax quadrivittate. Abdomen with a poorly defined subtriangular dorsocentral spot and lateral checkering on each tergite, black. Legs black. Wings subhyaline, veins slightly paler at bases. Calyptrae and halteres yellow.

Male.—Eyes rather densely pale haired; narrowest part of frons about as wide as third antennal segment; orbits with long setulose hairs below, which become much shorter above and extend to anterior ocellus; profile as in figure 8. Thorax with two pairs of presutural acrostichals and four pairs of postsutural dorsocentrals; hypopleura with a few hairs on upper margin in front of spiracle. Abdomen narrowly ovate, basal sternite bare, fifth with a broad deep excision. Fore tibia unarmed at middle, the hairs on apical half of ventral surface suberect but not very long; fore tarsus without long sensory hairs on posteroventral margin of basal segment, moderately densely clothed with short erect fine hairs; mid femur with about nine bristles on basal half on posteroventral surfaces which are in an irregular series; mid tibia with three long posterior bristles; hind femur with a series of anteroventral, and a few short posteroventral bristles on basal half; hind tibia with two anterodorsal and two anteroventral bristles, the anterior and posterior surfaces with the setulae stronger than usual.

Female.—Differs from the male in having the frons over one-third of the head-width, the orbits laterad of the bristles with rather long setulose hairs, the fore tibia with two posterior bristles, and the fore tarsus shorter.

Length, 8 to 9 mm.

Type—male, Mt. Washington, New Hampshire, alpine, (G. Dimmock), [U. S. National Museum]. *Allotype*, female, Mt. Washington, New Hampshire (Coll. Coquillett). *Paratypes*, females, White Mountains, New Hampshire (Morrison); Mt. Washington, New Hampshire, August 16, 1916, 2500 feet (C. W. Johnson); four males and one female, Mt. Marcy, New York, above the 4800 feet level, July 21 and 27, on flowers of *Potentilla tridentata* and *Arenaria groenlandica*, (J. Bequaert).

This species belongs to the same group as the European *alpicola* Zetterstedt, *chalcinata* Pandell, and *lugubris* Meigen. It differs, however, from all of these in one or more characters.

Phaonia serva (Meigen)

Anthomyia serva Meigen, Syst. Beschr., 5, p. 86, 1826.

This very common European species may be readily distinguished from any of its allies by the characters given in the key to species. In color and habitus it resembles *protuberans*. Normally there are but three pairs of postsutural dorsocentral bristles present, but sometimes there are four pairs. One pair taken in the White Mountains, by Morrison, which I have before me, have four pairs of postsutural dorso-centrals, but differ in no other manner from normal specimens from Europe and this country. The variation percentage in number of postsutural dorsocentrals is very small, but occasional aberrant examples occur in most species, and to prevent errors in identification, these must be carefully compared with species they resemble in other respects, before their description as new species.

Length, 7.5 to 8 mm.

I have seen examples of this species from Maine, Massachusetts, and New Hampshire.

Phaonia savonoskii new species

Female.—Similar to *protuberans* in color and markings.

Structurally similar to *serva*, distinguishable from it by the bristling of the fore and mid tibia, the former having one or two and the latter two anterodorsal bristles near middle.

Length, 9 mm.

Type.—Savonoski, Naknek Lake, Alaska, June 1919, (J. S. Hine).

Type returned to Professor Hine, who collected it on his last trip to the Mt. Katmai region for the National Geographic Society. Three female paratypes, Healy, Alaska, July 6, 1921, (J. M. Aldrich), [U. S. N. M.].

Phaonia caerulescens (Stein)

Aricia caerulescens Stein, Berl. Ent. Zeitschr., 1897, p. 187, 1897.

This species is readily separated from its allies by the bluish black color of the abdomen and the characters given in the key to species. The fore tarsi are similar to those of *protuberans*

and *serva*, and the fine hairs surrounding bases of the notopleural bristles are present as in *serva*. The fore tibia in either sex may have or lack the posterior median bristles.

I have seen this species from Moscow (*type*), Julietta, and Kendrick, Idaho; Los Gatos, California; Seattle, Washington and Cache Junction, Utah.

It occurs in February, and on till May, usually frequenting the flowers of willows.

Phaonia versicolor Stein

Phaonia versicolor Stein, Arch. für Naturges., abt. A, heft 9, 1918, p. 16, 1920.

This species, which was described from one female, is unknown to me. The type was obtained by Dr. Aldrich, in Marshall Pass, Colorado. It may not be related to the species with which I have associated it in my key, but I accept Stein's comparisons as indicating that it is.

Length, similar to *serva*.

Phaonia basiseta Malloch

Phaonia basiseta Malloch, Trans. Amer. Ent. Soc., XLVI, p. 133, 1920.

I have seen no additional material since describing the species, except some more specimens from Waubay, South Dakota, and Alaska. The species may be separated at once from its allies by the presence of the sub-basal bristle on posterodorsal surface of hind tibia. The fore tarsi are as in *serva*, and there are sparse hairs adjacent to bases of both the notopleural bristles.

Length, 7 mm.

Localities, Bozeman, Montana; Waubay, South Dakota, and Healy, Alaska, July 6, 1921, (J. M. Aldrich).

This species is most closely related to the European *basalis* Zetterstedt, having the same bristling of the legs and the same habitus as in that species. But *basalis* has the femora and tibiae reddish yellow, and the thorax and abdomen with yellowish gray pruinescence, while the abdomen has only a black dorsocentral vitta and no lateral checkerings.

The European species *morionella* Bezzi has the same color and habitus as *basiseta*, but the eyes are much more widely separated, the vibrissal angle is very much produced, and there are only three pairs of postsutural dorsocentral bristles on thorax.

Phaonia consobrina (Zetterstedt)

Anthomyza consobrina Zetterstedt, Ins. Lapp., p. 665, 1834.

I have before me a European male of this species, obtained from Mr. R. Frey, which was named by Stein. The latter records the species from this country, basing his identification on specimens taken in Colorado. I have not seen his specimens, and have seen no examples from this country which are identical with the one from Europe. In his paper Stein gives a key to the species of the genus, and judging from that I consider it probable that what he had before him was not *consobrina*, but *brunneinervis* Stein, as his type specimens runs down to *consobrina* in the key. The European specimen I have is quite different from *brunneinervis*, so we may retain the latter in our list, though I fear we have no grounds for the retention of *consobrina*.

Length, 8 mm.

Phaonia incerta new species

Male.—Similar in color to *consobrina* and *brunneinervis*. The calyptrae are, however, white with the margins faintly yellowish and not yellowish throughout; the wings are but slightly infuscated at bases, whereas in the other species they are slightly but distinctly brownish at base and along the courses of the veins on basal half or more; the large black subtriangular black mark on each abdominal tergite is more distinct than in *consobrina*.

Eyes densely hairy, the hairs about twice as long as in *consobrina*, frons similar, the orbits with fine short hairs on posterior half, bristled on anterior half; arista with the longest hairs not much longer than its basal diameter. Fore tibia with a fine long setulose hair on posterior surface beyond middle; mid femur with three or four bristles on basal half of posteroventral surface and also numerous long hairs; mid tibia without any anterodorsal bristles, with four on posterior side in an irregular series, and two on posteroventral surface; hind femur with a complete series of bristles on anteroventral surface and some on basal half of posteroventral; hind tibia with two or three anterodorsal and anteroventral bristles, the anterior and posterior hairs setulose but not very long; apical posterodorsal bristle small but distinct.

Length, 7 mm.

Type.—Yakutat, Alaska, (J. S. Hine), [Ohio State University].

This species resembles both *consobrina* and *brunneinervis*, being distinguished from the former as indicated in the foregoing description, and from the latter by the lack of anterodorsal bristles on mid tibia, and the much weaker setulose hairs on the posteroventral surface of the fore tibia.

This may be the species which I have already seen from the Southwest and considered as a variety of *brunneinervis*.

Phaonia monticola Malloch

Phaonia monticola Malloch, Trans. Amer. Ent. Soc., XLIV, p. 266, 1918.

This species is readily separated from its allies by the dense erect hairs on the ventral surfaces of the apical two-thirds of the fore tibia in both sexes, and by the presence of anterodorsal bristles on mid tibia.

I have seen this species from New Mexico (*type*), Colorado, and Labrador.

This is undoubtedly the species Stein records as *morio* Zetterstedt from this country.

I obtained males of the European species from three correspondents for comparison with my North American examples, and believe that the forms are different though closely related. The posteroventral bristles on the hind femur in my specimens of *morio*, from Finland and Sweden, are much longer than in those from America, and there are several minor distinctions present which prevent me uniting them at this time, though an examination of a larger series of both may ultimately result in that course being followed. I am of the opinion that the Italian specimens sent me as *morio* are not that species, but do not desire to go into the matter of distinctions in extralimital material at this time.

Phaonia brunneinervis (Stein)

Aricia brunneinervis Stein, Berl. Ent. Zeitschr., 1897, p. 183, 1897.

I have the type male of this species before me. As stated in the remarks under *consobrina*, I think that this is the species Stein records under that name from Colorado.

I have seen the species from Craig's Mountains, Idaho (*type*); Tennessee Pass, Colorado, and Gallatin County, Montana.

Phaonia fraterna new species

Male.—Similar to *serva* in color, differing in having the wings slightly brownish, not yellowish basally, the cross-veins noticeably, but not conspicuously darkened. Abdomen with a rather large subtriangular dorsocentral black mark on each tergite, and some lateral black checkerings.

Eyes long haired; narrowest part of frons as wide as distance across posterior ocelli; orbits setulose to above middle; parafacial as wide as third antennal segment, not narrowed below; face receding below; cheek twice as high as width of parafacial, with several series of marginal bristles; third antennal segment about 1.5 as long as second, its apex about one-fourth from mouth-margin; arista short haired. Presutural acrostichals not differentiated; postsutural dorso-centrals three; prealar long and strong; hypopleura with some hairs on upper margin in front of spiracle. Abdomen short ovate, basal sternite bare, fifth with a broad rounded posterior excision, rather densely hairy on sides apically, without strong bristles. Fore tibia without long hairs or bristles; fore tarsus slender, exceeding length of tibia; mid legs lacking in type; hind femur with a complete series of bristles on anteroventral surface, which are weaker basally, and a series on basal half of posteroventral surface; hind tibia with two anterodorsal, and two anteroventral bristles. Outer cross-vein curved; last section of fourth vein twice as long as preceding section.

Length, 6 mm.

Type.—Lunenburg, Massachusetts, May 19, 1916, (S. M. Dohanian), [U. S. N. M.].

Apparently closely related to *confluens* Stein, of Europe. I have not seen this species but the arista is described as long haired and the hind tibia more bristly.

Phaonia tipulivora new species

Male.—Black, slightly shining, densely grayish pruinescent. Frons parafacials, face, and cheeks almost silvery; antennae and palpi black. Thorax with four black vittae. Abdomen with a series of poorly defined but distinct black subtriangular spots and, when seen from the side, with some lateral black checkerings. Legs black, tibiae brownish. Calyptrae white. Halteres yellow.

Eyes densely hairy; narrowest part of frons about as wide as distance across posterior ocelli; interfrontalia almost obliterated above middle; orbits setulose nearly to anterior ocellus; parafacial as wide as third antennal segment, not appreciably narrowed below; cheek nearly twice as high as width of parafacial, with several series of bristles on lower margin; third antennal segment about 1.75 as long as second; arista with its longest hairs not as long as width of third antennal segment; palpi normal, setulose. Thorax without differentiated presutural acrostichal bristles; postsutural dorsocentrals four; prealar very long; hypopleura hairy on upper margin in front of spiracle; sternopleurals 1 : 2. Basal abdominal sternite bare, fifth as in *fraterna;* abdomen broadly ovate. Fore tibia with two or three posterior median bristles; fore tarsus slender, distinctly longer than tibia, with a few long sensory hairs along the posteroventral margin; mid femur with about six bristles on basal half of posteroventral surface; mid tibia with six or seven bristles in a double series on posterior side; hind femur with a complete series

of anteroventral bristles and a partial series on basal half of posteroventral surface; hind tibia with two anterodorsal and two anteroventral bristles, the anterior and posterior surfaces with some short setulose hairs on middle. Outer cross-vein curved.

Female.—Similar to the male in color and bristling of the legs. Interfrontalia without hairs on sides. Fore tibia with two posterior bristles; hind femur with a few weak posteroventral bristles.

Length, 9 mm.

The puparium is brownish red, shining, cylindrical, the extremities rounded, surface with microscopic transverse striae and a less distinct irregular network of short linear impressions. The metathoracic spiracles are elevated, about as high as thick, glossy; each segment has a transverse series of minute wart-like elevations which does not extend clear round the body; being widely interrupted ventrally, the apical segment having the transverse series very much shorter than those on other segments and connected with three longitudinal series, one in center and one at each extremity which extend midway to posterior spiracles, the latter small, blackish, but little elevated, separated by over twice the width of either; anal opening small, situated some distance from apex.

Length, 8 mm.

Type.—Hagerstown, Maryland, June 24, 1916, reared from tipulid pupa, Acc. no. 14022 (H. L. Parker), [U. S. N. M.].

Allotype.—Halfway House, Mt. Washington, New Hampshire, July 6, 1914, (C. W. Johnson).

Paratypes, males; Melrose Highlands, Massachusetts, May 21, 1916; Raynham, Massachusetts, April 29, 1916, (F. X. Williams); Lunnenburg, Massachusetts, May 21, 1916, (S. M. Dohanian).

Phaonia pallidula Coquillett

Phaonia pallidula Coquillett, Proc. U. S. Nat. Mus., xxv, p. 122.
Phaonia dulcis Stein, Arch. für Naturges., abt. A. 1918, heft 9, p. 5, 1920.

Male.—Black, subopaque. Head black, cheeks brownish, orbits, face, parafacials, and cheeks densely silvery white pruinescent; antennae brownish yellow, third segment infuscated except at base; palpi yellow. Thorax densely gray pruinescent, with four conspicuous brown vittae. Abdomen largely yellowish testaceous, bases of tergites fuscous and with gray pruinescence, each tergite with an elongate central black spot. Legs yellowish testaceous, fore femora except apices, and mid and hind femora each with a broad band beyond middle fuscous; tarsi pale. Wings clear, veins brown, yellow at bases, cross-veins very inconspicuously infuscated. Calyptrae white. Halteres yellow.

Eyes sparsely hairy, separated by distance across posterior ocelli; orbits contiguous above middle, with bristles on anterior half and one or two short

hairs on upper half; parafacial at base of antennae wider than the narrow third antennal segment, narrowed below; cheek about twice as high as widest part of parafacial; longest hairs on arista as long as width of third antennal segment. Thorax without differentiated presutural acrostichals; prealar long; postsutural dorsocentrals three; hypopleura with some weak hairs on upper margin in front of spiracle. Basal sternite bare. Fore tibia with a long median posterior bristle; fore tarsus slender, longer than tibia, basal segment without long outstanding posterior sensory hairs; mid femur with some long bristles on basal half of posteroventral surface; mid tibia with two long posterior bristles; hind femur with some moderately long hairs on basal third of ventral surface, a series of bristles on anteroventral surface which are very short basally and some long bristles on basal half of posteroventral surface; hind tibia with two anteroventral and two anterodorsal bristles; the calcar long, but little beyond middle.

Length, 7. 5 mm.

Redescribed from a male compared with type by Dr. Aldrich, Lakehurst, New Jersey, May 24, (W. T. Davis). Originally described from Georgia. Stein described *dulcis* from Austin, Texas, and Lakehurst, New Jersey.

Phaonia quieta Stein

Phaonia quieta Stein, Arch. für Naturges., 1918, abt. A, heft 9, p. 14, 1920.

I have identified as this species, which was described from three pairs taken by Dr. Aldrich at Friday Harbor, Washington, a male and female from California. Stein compares it with *erratica* Fallen and *errans* Meigen, so that it is unquestionably correctly placed in my key, and unless there are two very closely allied species here I am fairly confident that my identification is correct. Stein makes no mention of any of the characters I use in my key for separating it from its allies, and I have placed it in three categories to insure its identification should I be incorrect in my surmise.

Length, 8 to 9 mm.

Phaonia pulvillata (Stein)

Aricia pulvillata Stein, Ann. Mus. Nat. Hungar., II, p. 422, 1904.

This species was not included by Stein in his last paper on North American Anthomyiidae. It is very closely allied to *quieta*, or at least to the species which I have identified as that, having the same habitus and the characters as stated in the key.

It is paler in color, the abdomen in both sexes being largely yellowish testaceous, in the male on basal half, while in *quieta* the general color is black, with the apices or tergites yellowish. Apart from any hypopygial distinctions which may exist, the principal characters for the differentiation of the species are indicated in the key.

Stein's description of *pulvillata* fits my interpretation of *quieta* better in some respects than it does the former, but he specifically mentions the presence of a median posterior bristle on fore tibia in *pulvillata*, and this is present in even the male, whereas in the other species it is absent.

Originally described from Carolina. I have before me one male, Plummer's Island, Maryland, June 22, 1909, (W. L. McAtee); one female, same locality, June 14, 1908, (A. K. Fisher); one female, same locality, July 24, (N. Banks); one female, Delaware Water Gap, New Jersey, July 12, 1895, (C. W. Johnson?).

Phaonia rufibasis Malloch

Phaonia rufibasis Malloch, Proc. Biol. Soc., Wash., xxxii, p. 207, 1919.

This species is very similar to *errans* Meigen in color, differing in having the basal two antennal segments and base of third as well as the palpi reddish yellow. The coxae are largely, and the femora and tibia entirely reddish yellow.

Structurally similar to *errans* but the parafacials narrower, third antennal segment over twice as long as second. Basal abdominal sternite hairy. Hind femur with a series of anteroventral bristles and one or two rather long bristles at or near middle on posteroventral surface.

Length, 8 to 9 mm.

Originally described from Chester, Massachusetts, August 3, 1911. Type in collection of Boston Society of Natural History.

I have seen one male from Plummer's Island, Maryland, May 27, 1915, (R. C. Shannon), which is in the National Museum Collection.

Phaonia perfida Stein

Phaonia perfida Stein, Archiv für Naturges., 1918, abt., A, heft 9, p. 13, 1920.

I have not seen this species, which Stein described from one specimen without data, sent to him by Dr. Hough.

It seems extremely probable that the species is closely related to those with which I have associated it in the key, but only an examination of the type specimen will definitely decide that point.

Phaonia aurea new species

Female.—Reddish yellow, subopaque. Frons, parafacials anteriorly, third antennal segment, and palpi fuscous; occiput gray pruinescent. Thorax gray pruinescent, the dorsum with four reddish vittae. Abdomen with golden pollinosity, dorsum checkered, the yellow parts changing according to position from which the surface is viewed. Legs rufous yellow, tarsi fuscous. Wings slightly yellowish, cross-veins narrowly infuscated. Calyptrae and halteres yellow.

Frons at vertex one-third of the head-width, widened anteriorly; orbits narrow, each with about six bristles and a series of hairs laterad of them; eyes hairy; parafacial at base of antennae wider than width of third antennal segment, not much narrowed below; cheek about 1.5 as high as widest part of parafacial; third antennal segment twice as long as second; arista long plumose; palpi normal. Thoracic chaetotaxy as in *errans*. Basal abdominal sternite hairy. Fore tibia without a median posterior bristle; mid femur with four or five bristles on basal half of posteroventral surface; mid tibia with three or four posterior bristles; hind femur with a series of long bristles on anteroventral surface, the posteroventral surface bare; hind tibia with three or four anterodorsal and anteroventral bristles. Outer cross-vein curved; fourth vein straight at apex.

Length, 11 mm.

Type.—Washington State, (Coll. Coquillett), [U. S. N. M.].

Phaonia nigricans Johannsen

Phaonia nigricans Johannsen, Trans. Amer. Ent. Soc., XLII, p. 395, 1916.
Phaonia cayugae Johannsen, Ent. News, XXVIII, p. 327, 1917.
Phaonia nervosa Stein, Arch. für Naturges., abt. A, 1918, heft 9, p. 12 1920.

Stein redescribed this species from material sent to him from Ithaca, New York, the type locality of Johannsen's species.

Johannsen proposed the species name *cayugae* to replace the name *nigricans*, which has been used in the genus *Helina* (=*Mydaea* Stein), but such course is not necessary as the name has not previously been used in the genus *Phaonia*.

The species is very closely allied to *errans* but differs very much in color, the legs being usually entirely black, sometimes with the hind tibiae reddish brown. This is the only means by which the species may be separated, as in size and chaetotaxy they are to all appearances identical. The frons in the females

of *errans*, *varipes*, and *nigricans* has always some hairs on the sides of the interfrontalia.

I have seen this species from Ohio, Montana, Massachusetts, and Wisconsin, and have no doubt that it is widely distributed in the northeastern States.

Phaonia errans Meigen

Anthomyia errans Meigen, Syst. Beschr., v, p. 86, 1826.

Male.—Black, slightly shining, densely gray pruinescent. Interfrontalia opaque black except when seen from in front; orbits, parafacials, and cheeks with whitish tomentum or pile; face yellowish gray pruinescent; antennae and palpi black. Dorsum of thorax with four black vittae; scutellum largely reddish yellow apically. Abdomen with an interrupted dorsocentral vitta and lateral checkerings black; fifth sternite reddish yellow apically. Legs rufous yellow, fore femora except apices, sometimes the bases of mid femora, and all of tarsi fuscous. Wings subhyaline, cross-veins slightly infuscated. Calyptrae yellowish white. Halteres yellow.

Eyes hairy, separated at narrowest part of frons by a distance less than width of third antennal segment; orbits narrow, bristles on anterior half and finely haired on posterior half almost to anterior ocellus; interfrontalia distinct on entire length; parafacials a little wider than third antennal segment, but little narrowed below; cheek twice as high as widest part of parafacial, with bristly hairs on lower half and some setulose hairs above vibrissae; third antennal segment twice as long as second; arista plumose. Thorax without presutural acrostichal bristles; postsutural dorsocentrals four; prealar very long; many hairs adjacent to notopleurals; hypopleura with some fine hairs on upper margin in front of spiracle. Basal abdominal sternite hairy, fifth deeply cleft. Fore tibia unarmed at middle; mid femur with about half a dozen bristles on basal half of posteroventral surface, the fine hairs rather long; mid tibia with two or three posterior bristles; mid tarsus with the short spines on anteroventral and posteroventral margins of segments two to four confined to apical halves; hind femur with a series of anteroventral bristles, and usually one or two short bristles on middle of posteroventral surface; hind tibia with two anterodorsal and three or four anteroventral bristles. Outer cross-vein much curved.

Female.—Similar to the male in color, but the fore femora are less conspicuously blackened.

Eyes hairy, separated by about one-third of the head-width; interfrontalia with some erect hairs on each side above. In other respects as male.

Length, 8 to 9.5 mm.

Described from several males and one female received from Scotland and Finland. Stein has recorded the species from Sandusky, Ohio. I have before me a pair taken at Sandusky, Ohio, which are evidently from the same lot as Stein's specimens.

as both were taken by Professor Hine. A female with the label, "Algonquin Park," evidently belongs here.

Phaonia errans variety **completa** new variety

Male.—Differs from true *errans* in having all the femora and tibiae rufous yellow, and the short spines on anteroventral and posteroventral margins of the intermediate segments of mid tarsi continued to bases of segments. There is also only one pair of praescutellar acrostichals present.

Length, 8 mm.

Type.—Base Station, Mt. Washington, New Hampshire, August 15, 1916, (C. W. Johnson), [Boston Society of Natural History].

Phaonia errans variety **varipes** Coquillett

Hyetodesia varipes Coquillett, Proc. Wash. Acad. Sci., II, p. 441, 1902.

This form differs from true *errans* only in having the femora more extensively darkened, the fore and mid pairs in male being almost entirely infuscated. There are neither chaetotaxic nor structural distinctions which warrant its separation from true *errans*, and it is in my opinion merely a variety of that species.

I have examined a male and female paratype sent to me from the National Museum Collection by Dr. Aldrich, and have also seen a male from Kuskokwim Valley, Alaska.

Phaonia deleta Stein

Aricia deleta Stein, Berl. Ent. Zeitschr., 1897, p. 178, 1897.

Male and female.—Black, slightly shining, densely gray, pruinescent. Anterior margin of frons, parafacial, and a large part of cheeks, antennae, except apical two-thirds of third segment, and palpi reddish yellow. Thorax with four fuscous vittae. Abdomen with an elongate blackish spot on middle of each tergite; fourth tergite in both sexes conspicuously yellowish testaceous at apex; fifth sternite in male partly yellowish. Legs testaceous yellow; coxae anteriorly, fore femora on posterodorsal surface, and the tarsi more or less conspicuously, infuscated. Wings hyaline, veins brown, yellowish basally, cross-veins slightly clouded. Calyptrae whitish yellow. Halteres yellow.

Male.—Eyes sparsely hairy; frons at narrowest part distinctly wider than width across posterior ocelli; orbits with setulose hairs from base of antennae to anterior ocellus, the upper setulae weak and short; interfrontalia entire; parafacials at base of antennae a little wider than third antennal segment, not narrowed below; cheek twice as high as width of parafacial, with some long bristles along lower margin and a single series above them which are strong and upwardly curved anteriorly; third antennal segment narrow, ending considerably short of the mouth-margin, about 1.75 as long as second; longest hairs on arista much longer than width of third antennal segment; palpi not

dilated. Thorax without strong presutural acrostichal bristles; postsutural dorsocentrals four; prealar very long; hypopleura hairy on upper margin in front of spiracle. Abdomen ovate, basal sternite bare, fifth with a deep, slightly rounded posterior excision. Fore tibia with a median posterior bristle; fore tarsus longer than tibia, the basal segment without long sensory hairs along posterior surface; mid femur with two or three bristles on basal third of posteroventral surface; mid tibia with four or five posterior bristles and usually one longer bristle on middle of posteroventral surface; hind femur with a number of long bristles on basal third of posteroventral surface; mid tibia with four or five posterior bristles and usually one longer bristle on middle or posteroventral surface; hind femur with a number of long bristles on apical half of anteroventral surface and some short stout spines or bristles in a single or double series on apical half of posteroventral; hind tibia with about four anterodorsal bristles, the anteroventral surface with about four weak setulae, which are not much stronger than the erect series on the anterior and posterior surfaces, basad of the calcar there are usually from one to three additional bristles on the same surface (fig. 24). Outer cross-vein curved.

Female.—Differs from the male in having the eyes almost bare, separated by fully one-third of the head width, the fore tibia usually with an anterodorsal and an extra posterior bristle, the hind femur with the short posteroventral bristles and the hind tibia with the erect anterior setulae and posterior hairs absent.

Length, 7 to 8 mm.

Originally described from Illinois and Pennsylvania. I have seen most of the material that Stein used in describing the species and in addition have examined specimens from Buffalo, Lancaster, Niagara Falls, and Hamburg, New York, and Quebec and Ontario, Canada.

Phaonia soccata (Walker)

Anthomyia soccata Walker, List. Ins. Brit. Mus., pt. 4, p. 941, 1849.

This species has a similar coloration to that of *serva* Fallen and its allies, but the legs are reddish yellow except the tarsi. The thorax is not distinctly vittate, and the abdomen is marked as in *serva*.

The eyes of the male are rather long haired and widely separated, the narrowest part of frons being about one-fifth of the head-width; the orbits are bristled to a little above the level of the anterior ocellus; parafacial as wide as third antennal segment, not narrowed below; longest hairs on arista barely as long as width of third antennal segment. Thorax without strong presutural acrostichals; prealar very long; postsutural dorsocentrals four; hypopleura hairy on upper margin in front

of spiracle. Basal abdominal sternite bare, fifth with a very broad rounded posterior excision. Fore tibia with one or two median posterior bristles; fore tarsi slender, without long sensory hairs along the posterior side of basal segment; mid tibia with three or four posterior bristles; hind femur without exceptional armature, hind tibia with a bristle near base on posterodorsal surface, the apical posterodorsal bristle barely distinguishable.

Length, 7.5 mm.

I have seen this species only from New York.

Phaonia frenata (Holmgren)

Aricia frenata Holmgren, Ins. Nordgroenl., p. 103, 1872.

I have seen this species only from Alaska. The summary of the characters of the male given in the key to species should enable students to recognize that sex. I have not seen the female.

Length, 6 mm.

Originally described from Greenland.

Phaonia alticola new species

Female.—Black, shining, with distinct but not very dense bluish gray pruinescence. Head entirely black. Thorax quadrivittate. Abdomen with a poorly defined dorsocentral vitta and lateral checkerings black. Legs black. Wings clear, cross-veins not infuscated. Calyptrae yellowish. Halteres dark brown.

Eyes with short hairs; frons about two-fifths of the head-width; orbits strongly bristled, with two series of bristles on upper half and many lateral setulose hairs below; parafacial at base of antennae wider than third antennal segment, not narrowed below; cheek about twice as high as width of parafacial, with a series of bristles on lower margin and some hairs above them; antennae short, third segment not twice as long as second; arista with very short pubescence; palpi slender. Thorax without strong presutural acrostichals; postsutural dorsocentrals three; prealar long; hypopleura bare; sternopleurals 1 : 2. Basal abdominal sternite bare, genitalia normal. Fore tibia with two posterior median bristles; fore tarsus slender, longer than tibia, basal segment without long sensory hairs and not densely haired; mid femur with one or two bristles on basal half of anteroventral surface and five or six on basal half of posteroventral; mid tibia with two anterodorsal and three posterior bristles; hind femur with a series of long bristles on anteroventral surface, and a few on basal half of posteroventral; hind tibia with three or four anteroventral and two anterodorsal bristles, the apical posterodorsal bristle very small. Costal thorn long; last section of fourth vein about as long as preceding section.

Length, 9 mm

Type.—North East Truchas Peak, New Mexico, above timber line, August 2, (W. P. Cockerell), [U. S. N. M.].

A rather aberrant species. The orbital bristling shows an approach to that of the genus *Dendrophaonia*, but the cheeks, thorax, and legs are bristled differently from those of the species of that genus.

Phaonia azygos new species

Male and female.—Black, subopaque, densely pale gray pruinescent. Thorax with two faint fuscous vittae anteriorly which do not extend beyond middle of dorsum. Abdomen with one elongate black spot in middle of each tergite, which form an almost uninterrupted vitta, the spot on fourth tergite very faint. Legs black, the knees slightly reddish in female. Wings slightly grayish, the cross-veins faintly browned. Calyptrae white. Halteres yellow.

Male.—Eyes very faintly hairy; frons on upper half very narrow, consisting of the whitish contiguous orbits, the setulae confined to anterior half; parafacials almost linear; cheek twice as high as width of third antennal segment, sparsely bristled on lower margin, two or three of the bristles upcurved; arista plumose; third antennal segment three times as long as wide. Presutural acrostichal bristles absent, the hairs fine, in about four series; postsutural dorsocentrals three; prealar long; sternopleurals one to two; no hairs near notopleurals. Abdomen ovate; basal sternite bare. Fore tibia without a median posterior bristle; fore tarsus slender, longer than tibia, without erect sensory hairs along sides of basal segment; mid femur with a complete series of fine bristles on posteroventral surface which become shorter apically; mid tibia with two posterior bristles; hind femur with a complete series of anteroventral bristles which become longer apically, and some shorter bristles on apical half or less of posteroventral surface; hind tibia with one anterodorsal and two anteroventral bristles, the calcar short, about one-fifth from apex, apical anterodorsal and anterior bristles subequal, apical posterodorsal absent. Outer cross-vein almost straight; veins three and four divergent at extreme apices.

Female.—Frons normal; hind femur with three or four anteroventral bristles on apical third.

Length, 5 mm.

Type.—Male; Black Mountain, Lake George, New York, September 4, 1920: *allotype*, female; Thatcher Park, Heldeberg Mountains, Albany, New York, May 27, 1920, (H. C. Huckett), [Amer. Entom. Soc.].

This species runs to *nigrocincta* Stein in Stein's key, but that species does not occur in North America.

Phaonia citreibasis Malloch

Phaonia citreibasis Malloch, Ohio Jour. Science, xx, p. 268, 1920.

This species is glossy black with slight grayish pruinescence on thorax and abdomen, the thorax quadrivittate and the abdomen with a poorly defined dorsocentral vitta. Legs black. Bases of wings, calyptrae, and halteres bright orange.

Eyes sparsely hairy, separated by about the distance across posterior ocelli; arista pubescent. Thorax with two pairs of long fine presutural acrostichals and four pairs of postsutural dorsocentrals; prealar very long. Fore tibia without a median posterior bristle; hind tibia with two to four anteroventral and two anterodorsal bristles.

Length, 8 mm.

Originally described from Alaska.

Phaonia atrocitrea new species

Female.—Shining black, almost glossy, with slight but distinct grayish pruinescence on thorax and abdomen. Arista entirely black. Thorax quadrivittate. Abdomen with faint checkerings. Legs black. Wings yellowish at bases, cross-veins narrowly infuscated. Calyptrae orange yellow. Halteres with black knobs.

Eyes with very short hairs; frons about one-third of the head-width; orbits with strong bristles and lateral setulose hairs; parafacial at base of antennae wider than third antennal segment, narrowed below; cheek a little higher than widest part of parafacials, with a series of marginal bristles; third antennal segment not twice as long as second; arista with short pubescence; palpi slightly dilated. Thorax without strong presutural acrostichals; postsutural dorsocentrals four; prealar long; hypopleura with some hairs in middle below spiracle; sternopleurals one to two. Basal abdominal sternite bare. Fore tibia with one or two median posterior bristles; fore tarsus slender, a little longer than tibia, basal segment without long sensory hairs, not densely haired; mid femur with an anteroventral and a posteroventral series of bristles which are rather short; mid tibia with two or three posterior bristles; hind femur with anteroventral series of long bristles and a posteroventral series which does not extend to apex; hind tibia with two anterodorsal and three anteroventral bristles, the apical posterodorsal bristle minute, the others long.

Length, 8 mm.

Type.—Savonoski, Naknek Lake, Alaska, July, 1919, (J. S. Hine), [Ohio State University].

This species bears a very strong resemblance to *citreibasis*, but in that species the arista is yellow at base, the wings are much brighter yellow at bases, the halteres are orange yellow, and the hypopleura is bare.

Phaonia dissimilis new species

Male.—Shining black, with rather dense bluish gray pruinescence. Head black, interfrontalia opaque, orbits, parafacials, and cheeks with silky white pruinescence. Thorax distinctly quadrivittate. Abdomen with a black dorsocentral vitta and lateral checkerings. Legs black. Wings clear, veins black, cross-veins faintly darkened. Calyptrae white, the outer margin of the lower one fuscous, much darker than the field. Halteres brown.

Eyes rather long haired, separated at narrowest part of frons by about the width of third antennal segment; orbits not contiguous, setulose almost to anterior ocellus; parafacial at base of antennae about as wide as third antennal segment, slightly narrowed below; cheek twice as high as widest part of parafacial, with some fine bristles on margin and above them two series of fine hairs; third antennal segment about twice as long as second; arista with its longest hairs a little longer than its basal diameter. Thorax without strong presutural acrostichals; postsutural dorsocentrals four; prealar long; no hairs adjacent to notopleural bristles; hypopleura bare. Abdomen ovate. Basal sternite bare, fifth with a broad moderately deep posterior excision. Fore tibia without a median posterior bristle, the hairs on that surface longer than usual, forming a series of suberect setulae from base to apex; fore tarsus slender, longer than tibia, the basal segment with the posterior sensory hairs of moderate length; mid femur with rather long hairs on ventral surfaces, those on basal half of posteroventral surface stronger than the others; mid tibia with three posterior bristles, the short hairs longer than usual, especially on posteroventral and posterodorsal surfaces, those on latter forming a series of setulae on its entire length; hind femur similar to mid pair but with a series of bristles on apical half of anteroventral surface; hind tibia with two anterodorsal and two or three anteroventral bristles, the surface hairs on posterior and anterodorsal surfaces setulose.

Length, 7.5 mm.

Type.—Savonoski, Naknek Lake, Alaska, July, 1919, (J. S. Hine), [Ohio State University].

Phaonia imitatrix Malloch

Phaonia imitatrix Malloch, Rep. Can. Arctic Exped. 1913–18, III, Insects, pt. C, Diptera, p. 61c, 1919.

Male.—Glossy black, almost without pruinescence except on orbits, parafacials, face and cheeks. Legs black. Wings clear, fuscous at bases, veins black. Calyptrae white. Halteres black

Eyes almost bare; frons at least twice as wide as distance across posterior ocelli; orbits narrow, rather strongly bristled up to anterior ocellus; parafacial at base of antennae as wide as third antennal segment, not narrowed below; vibrissal angle produced; cheek over one-third as high as eye; arista almost bare. Thorax with four pairs of postsutural dorsocentrals; prealar almost as long as the bristle behind it. Abdomen subcylindrical, slightly tapered apically; basal sternite bare, fifth with an undulated posterior emargination.

Mid tibia with two posterior bristles; hind tibia with two or three anterodorsal and four or five anteroventral bristles. Third wing-vein ending before tip of wing, the wing rounded at apex.

Length, 7 mm.

Originally described from Bernard Harbour, North West Territory, Canada.

Phaonia fuscisquama Van der Wulp

Phorbia fuscisquama Van der Wulp, Biol. Cent.-Amer., Diptera, 1, p. 340, 1886.

Male.—Deep black, shining, with brownish gray pruinescence which is most dense on dorsum of abdomen. Thorax not vittate. Abdomen with a series of elongate black dorsocentral spots forming an interrupted vitta. Legs black. Wings slightly infuscated, veins black. Calyptrae fuscous. Knobs of halteres yellow.

Eyes bare, separated by not more than width of anterior ocellus; parafacial at base of antennae narrower than third antennal segment; becoming linear below; cheek about as high as width of third antennal segment, profile as in figure 10; arista with very short pubescence. Thorax with the presutural acrostichals long, but not in differentiated pairs; prealar very short; postsutural dorsocentrals four; sternopleurals 1 : 1; basal pair of scutellars much shorter than apical pair. Abdomen narrowly ovate, basal sternite bare. Fore tibia unarmed at middle, shorter than fore tarsus; mid femur without strong ventral bristles; mid tibia with a posterodorsal bristle about one-third from apex; hind tibia with one anterodorsal and one anteroventral bristle. Auxiliary vein approaching costa much more gradually than in the other species, first posterior cell narrowed apically.

Length, 5 mm.

Described from a paratype supplied by the British Museum, from Omilteme, Guerrero, Mexico, (H. H. Smith).

This species has the habitus of a *Hydrotaea* and similar wing venation, but the fore femora are not excavated and armed with a spine on ventral surface before apex as in that genus.

Phaonia morrisoni new species

Male.—Similar to the preceding species in color. Differs from it in having the calyptrae yellow, and the abdomen gray pruinescent and with an indistinct dorsocentral vitta.

Eyes pubescent; profile similar to that of preceding species. The chaetotaxy of the thorax is as in that species, as is the bristling of the legs except the hind femora. In addition to the distinction mentioned in the key the type has no bristle on the anteroventral surface of hind tibia, but in the paratype there is a bristle on that surface on one tibia. The first posterior wing cell is not narrowed at apex.

Length, 4 to 5 mm.

Type.—White Mountains, New Hampshire, (Morrison), [U. S. N. M.]. *Paratype.*—Killington Park, Vermont, August 23, 1898, [Bost. Soc. Nat. Hist.].

Phaonia minima Malloch

Phaonia minima Malloch, Rep. Can. Arctic Expel. 1913–18, III, pt. C, Insects, Diptera, p. 61c, 1919.

This species is very similar to the preceding, but differs in having no short stout outstanding bristle on posteriordorsal surface near apex, as stated in key.

Length, 4 to 5 mm.

In addition to the type and allotype specimens from Nome, Alaska, which, I have before me, I have seen one male from St. Paul Island, Alaska, August, 1910, collected by H. Heath, which belongs to the Leland Stanford University collection.

I have seen one female which was taken in Montana that is referable to either this or the preceding species, but it is not possible to definitely decide its identity.

Phaonia albocalyptrata Malloch

Phaonia albocalyptrata Malloch, Ohio Jour. Science, XX, p. 267, 1920.

This species has a coloration similar to that of *dissimilis*, but the abdomen has no distinct lateral checkerings and the calyptrae are both white.

The eyes are sparsely hairy, the frons at narrowest part is twice as wide as third antennal segment, the orbits have long setulose hairs to level of anterior ocellus, the parafacials are as wide as the third antennal segment and nearly as wide as height of cheek, the arista is short pubescent. Thorax with two or three pairs of long fine presutural acrostichals; prealar long. Basal abdominal sternite hairy. Apical posterodorsal bristle on hind tibia weak and small; hairs on tibia not as long as in *dissimilis*.

Length, 7 mm.

Originally described from Savonoski, Naknek Lake, Alaska. Type in collection of Ohio State University.

Phaonia marylandica new species

Male.—Black, shining, gray pruinescent. Orbits, parafacials, face and cheeks silvery white; antennae and palpi yellow, third segment of former brownish. Thorax with four black vittae; scutellum black; humeri slightly yellowish. Abdomen in type missing. Legs entirely yellow. Wings clear, cross-veins not infuscated. Calyptrae and halteres yellowish.

Eyes almost nude, separated at narrowest part of frons by not more than width of third antennal segment; orbits setulose to above middle, contiguous for some distance centrally; parafacial almost linear; longest hairs on arista longer than width of third antennal segment. Thorax with one long and two short pairs of presutural acrostichal bristles; postsutural dorsocentrals four; prealar long; hypopleura bare. Fore tibia unarmed at middle; fore tarsus slender, basal segment with some long outstanding sensory hairs on posteroventral margin; mid femur with some fine bristles on basal half of posteroventral surface; mid tibia with two or three posterior bristles; hind femur with some bristles on apical half of anteroventral surface, the posteroventral surface without bristles except at extreme base and apex; hind tibia with two anteroventral and two anterodorsal bristles.

Length, 8 mm.?

Type.—Plummer's Island, Maryland, May 16, 1902, (R. P. Currie), [U. S. N. M.].

Phaonia harti new species

Male and female.—Black, shining, densely gray pruinescent. Head with silvery white on orbits, lunule, and especially on parafacials; interfrontalia velvety black except when seen from in front; antennae black; second segment partly reddish yellow; palpi reddish yellow, sometimes infuscated apically. Thorax conspicuously quadrivittate. Abdomen with a black dorsocentral vitta. Legs black, sometimes with only the knees conspicuously reddish yellow, but the tibiae are always paler than the femora and are sometimes obscurely reddish yellow. Wings clear, veins brown, paler basally, the cross-veins not noticeably infuscated. Calyptrae white. Halteres yellow.

Male.—Eyes with very short sparse hairs; narrowest part of frons usually distinctly wider than distance across posterior ocelli; interfrontalia complete; orbits with rather strong bristles from base of antennae to a short distance from anterior ocellus; profile as in figure 11; longest hairs on arista as long as width of third antennal segment; palpi dilated, with short stubby black bristles except basally. Thorax with two pairs of presutural acrostichal bristles; prealar over half as long as the bristle behind it; postsutural dorsocentrals four; hypopleura with a few hairs on middle below spiracle. Abdomen elongate ovate, tapered apically; basal sternite bare, fifth with a broad shallow rounded posterior emargination. Fore tibia without a median posterior bristle; fore tarsus with the sensory hairs on posteroventral margin of basal segment of moderate length; mid femur with some rather irregular and not very long bristles on basal half of posteroventral surface; mid tibia with two or three posterior bristles; hind femur with eight or nine bristles on apical half of anteroventral surface, and four or five on basal half of posteroventral; hind tibia with two or three anteroventral and anterodorsal bristles. Outer cross-vein much bent in middle.

Female.—Frons one-third of the head-width at vertex, widened anteriorly; orbits narrow, the bristles strong, some hairs laterad of them anteriorly; interfrontalia bare. Fourth abdominal tergite distinctly longer than third, the apical bristles weak.

Length, 7 to 8 mm.

Puparium.—Glossy dark red. Almost cylindrical, slightly tapered at each end, surface smooth except narrowly at incisions between segments, where there are many close fine striae, the ventral surface with microscopic striae on the greater part of surface; a rather broad band of microscopic points on anterior margin of each ventral segment which tapers to a point on each side. Anterior respiratory organs small, pale, with six branches which are visible only under a high power lens and are arranged vertically; metathoracic spiracles elevated, slender, each about three times as long as its diameter, slightly curved and tapered apically; anal respiratory discs sessile, the inner part with the slits elevated slightly above the disc, the slits small, radiating, distance between bases of discs equal to 1.5 times the diameter of one disc; apex of abdomen with some irregularly arranged sharp ridges, two of which surround the spiracular discs laterally, but at a considerable distance from them, the other ridges connected with this circular one and extending from it longitudinally or diagonally; area surrounding anal opening granulose, with some fine striae on outer margins.

Length, 8 to 9 mm.

Type, *allotype*, and *paratypes*.—Urbana, Illinois, March-April, 1916, reared, (J. R. Malloch). *Paratypes*, ten specimens, same locality, May 28, 1890, (C. A. Hart); one specimen, Dyke, Virginia, July 10, 1916; one specimen, Great Falls, Virginia, May 2, 1917; one specimen, Potlach, Idaho, September 9, 1912; one specimen, Lacombe, Canada. Type in collection of Illinois Natural History Survey.

The above puparium description was made from puparia of the type series. The larvae are predaceous and live under the bark of freshly fallen trees and slightly loosened bark of trees still standing. They can subsist on the sap which is present where they occur, but so readily attack other larvae that they may be classed as really predaceous.

The larvae that I have found along with them at Urbana, Illinois belong to the following species or families. *Lonchaea polita* Say, *L. laticornis* Zetterstedt, Pachygastrinae, and Ortalidae. With the exception of the Pachygastrinae the others are predaceous.

Phaonia striata (Stein)

Aricia striata Stein, Berl. Ent. Zeitschr., 1897, p. 179, 1897.

Male.—Black slightly shining, densely brownish gray pruinescent. Antennae black, second segment reddish; palpi fuscous, reddish basally. Thoracic dorsum quadrivittate; scutellum yellowish apically. Abdomen with a poorly defined but distinct dorsocentral black vitta, and, when seen from certain angles, with lateral blackish checkerings. Legs yellowish testaceous,

coxae, fore femora except their apices, basal half of mid femora, and bases of hind femora infuscated, tarsi black. Wings hyaline, cross-veins not infuscated. Calyptrae and halteres yellowish.

Eyes densely long haired; narrowest part of frons as wide as distance between posterior ocelli; orbits with fine bristles and hairs from base of antennae to anterior ocellus, those above middle short and weak; parafacial at base of antennae much narrower than third antennal segment, not narrowed below; cheek about twice as high as width of third antennal segment, with about five series of fine bristles on lower third, the upper two or three series weak, upwardly curved anteriorly (fig. 12); third antennal segment fully twice as long as second; longest hairs on arista distinctly shorter than width of third antennal segment; palpi barely widened apically. Thorax with two pairs of presutural acrostichals; prealar at least half as long as the bristle behind it; postsutural dorsocentrals four; hypopleura with a few fine hairs below spiracle. Abdomen broadly ovate; basal sternite bare, fifth with a very broad shallow posterior emargination, appearing almost transverse. Fore tibia without a median posterior bristle; fore tarsus distinctly longer than tibia, basal segment with the sensory hairs on posterioventral margin very short, only the one at apex long; mid femur with some bristles on basal half of posteroventral surface, those at middle longest; mid tibia with three posterior bristles; hind femur with a series of closely placed, moderately long bristles on entire anteroventral surface, and some much finer bristles on basal half of posteroventral surface; hind tibia with three or four anteroventral and two or three anterodorsal bristles.

Length, 7.5 mm.

Redescribed from the specimen in the Hough collection which is assumably the type. Locality, Moscow, Idaho.

The allotype is not in the collection. Stein states in his original description that the female has the femora entirely yellow and the interfrontalia with a pair of cruciate bristles.

Phaonia uniseriata new species

Female.—Black, slightly shining, densely gray pruinescent. Interfrontalia opaque brownish black when seen from above, the remainder of head except eyes with brownish gray pruinescence; antennae and palpi entirely black. Thorax indistinctly quadrivittate. Abdomen with a poorly defined dorsocentral vitta and lateral checkerings black. Legs black, extreme apices of femora and at least the hind tibiae reddish. Wings slightly brownish, veins brown, paler basally, cross veins slightly infuscated. Calyptrae and halteres obscurely yellowish.

Eyes with moderately long and dense hairs; frons one-third of the head-width of vertex, widened anteriorly; interfrontalia bare; orbits narrow, each with six or seven bristles and laterad of these numerous setulose hairs; antennae stout, third segment about twice as long as second; longest hairs on arista not longer than its basal diameter; parafacial at base of antennae a little wider than third antennal segment narrowed below; cheek a little higher than

widest part of parafacial, with three or four series of bristles on lower half; palpi distinctly broadened apically, the bristles fine and of average length. Thorax with two or three pairs of long presutural acrostichals which are set very close together, forming almost a single irregular series; postsutural dorsocentrals four; prealar long; hypopleura with some fine hairs below spiracle. Abdomen with the basal sternite bare; fourth tergite distinctly longer than third; apical paired genital processes with short stiff erect hairs. Fore tibia without a median posterior bristle; fore tarsus longer than fore tibia, basal segment without long sensory hairs on posterior side; mid femur with a series of long bristles on basal two-thirds of posteroventral surface and some much shorter bristles on basal half of anteroventral; mid tibia with two or three posterior bristles; hind femur with a series of stout bristles on anteroventral surface and some long hair-like bristles on basal half of posteroventral surface; hind tibia with two or three anterodorsal and three or four anteroventral bristles, calcar long. Outer cross-vein curved.

Length, 7.5 mm.

Type.—Pullman, Washington, May 19, 1921, (A. L. Melander), in collection of Dr. A. L. Melander.

This specimen resembles *striata* Stein so closely that I at first thought it might be the female of that species. But Stein has described the female of *striata* as having the legs entirely yellow, and the frons with a pair of cruciate interfrontal bristles, neither of which characters apply to the specimen before me.

Phaonia brevispina new species

Male and female.—Black, slightly shining, densely gray pruinescent. Antennae black, basal two segments brownish; palpi fuscous, usually paler at bases. Thorax distinctly quadrivittate; scutellum blackish in center. Abdomen with a more or less distinct dorsocentral vitta and lateral checkerings black. Legs black or dark brown, apices of femora and all of tibiae brownish yellow. Wings clear; cross-veins distinctly infuscated. Calyptrae white. Halteres yellow.

Male.—Eyes almost bare, separated at narrowest part of frons by a distance over twice as great as width across posterior ocelli; orbits with setulae to anterior ocellus; cheek about one-third of the eye height; longest hairs on arista at least as long as width of third antennal segment; palpi but little dilated. Thorax as in *harti*. Mid tibia with two posterior bristles; hind femur with very short stout bristles on anteroventral surface, and in the larger specimens with similar but weaker bristles on posteroventral surface; hind tibia usually with two anterodorsal and two anteroventral bristles. Outer cross-vein very slightly curved.

Female.—Differs from a male in having the palpi noticeably dilated, frons over one-third of the head-width and sometimes with a pair of weak interfrontal cruciate bristles. Fouth abdominal tergite not noticeably longer than third.

Length, 6.5 to 8 mm.

Type.—Male; Urbana, Illinois, August 1, 1916, (Malloch), [Illinois Natural History Survey]. *Allotype.*—Female; Same locality, September 5, 1915, at sap exuding from tree trunk, (Malloch). *Paratypes.*—Two males, Glen House, New Hampshire, June 11, 1916; one female, Mount Washington, New Hampshire, June 30, 1913, (C. W. Johnson); two males, Fall Church, Virginia, April 13 and May 3, (N. Banks); one female, Wauseon, Ohio, August 18, 1914, (J. S. Hine); one male, Viento, Oregon, July 1, 1917, (A. L. Melander); two male, Moscow Mountain, Idaho, July 4, 1911, (J. M. Aldrich); one male, Hoqulam, Washington, June 3, 1904, (Burke).

Phaonia fuscicauda Malloch

Phaonia fuscicauda Malloch, Trans. Amer. Ent. Soc., XLIV, p. 269, 1918.
Phaonia fuscinervis Stein, Arch. für Naturges., 1918, abt. A, heft 9, 1920.

Male and female.—Head testaceous yellow, upper half of occiput fuscous gray pruinescent; third antennal segment largely brown; palpi testaceous, yellow. Thorax testaceous yellow, disc of mesonotum, and scutellum, the metanotum, and some poorly defined areas on pleura fuscous. Abdomen testaceous yellow, fuscous at apex, colored with gray pruinescence, and with a brownish or fuscous dorsocentral vitta which is most distinct on basal three tergites. Wings clear, both cross-veins narrowly infuscated. Calyptrae and halteres yellow.

Male.—Eyes sparsely but distinctly haired, separated at narrowest part of frons by little more than width of anterior ocellus; orbits setulose to a little above middle, where they are contiguous; parafacial narrower than third antennal segment; cheek about twice as high as width of third antennal segment; longest hairs on arista longer than width of third antennal segment. Thorax with two pairs of fine presutural acrostichals; postsutural dorsocentrals three; prealar long; hypopleura bare. Basal sternite bare, fifth with a deep central excision. Fore tibia unarmed at middle; mid femur with about six bristles on basal half of posteroventral surface; mid tibia with two or three posterior bristles; hind femur with long bristles on anteroventral surface and short bristles on basal half of posteroventral; hind tibia with two or three anteroventral and anterodorsal bristles; calcar about one-fourth from apex.

Female.—Frons over one-third of the head-width.

Length, 7 to 8 mm.

Originally described from California. I have before me two males and one female from Kamiac Butte, Washington, and one female from Brooklyn, California, Stein described *fuscinervis* from Friday Harbor, Washington.

Phaonia texensis new species

Male and female.—Black, subopaque, densely gray pruinescent. Antennae reddish yellow, third segment brownish apically; palpi reddish yellow. Thorax with four fuscous vittae, and posteriorly with a central brown vitta which extends over disc of scutellum. Abdomen with a slightly interrupted dorsocentral fuscous vitta, and a pair of less distinct brown spots on each tergite; apex of fourth tergite rufous yellow. Legs reddish yellow; all femora broadly infuscated basally, tarsi black. Wings clear, both cross-veins conspicuously infuscated, the outer with its extremities more conspicuously so than its central part. Calyptrae white. Halteres yellow.

Male.—Eyes hairy, separated at narrowest part of frons by a distance two or three times as great as width across posterior ocelli; orbits narrow, strongly bristled to anterior ocellus; parafacial at base of antennae at least as wide as third antennal segment; cheek twice as high as widest part of parafacial; setulae continued some distance above vibrissa; third antennal segment about three times as long as second; longest hairs on arista as long as width of third antennal segment; palpi broad. Thorax with three pairs of presutural acrostichals, and four pairs of postsutural dorsocentrals; prealar long; hypopleura with a few fine hairs on upper margin in front of spiracle. Basal abdominal sternite bare, fifth with a deep posterior excision. Fore tibia unarmed at middle; mid femur with bristles on basal half of posteroventral surface; mid tibia with about six unequal sized bristles in a double series on posterior side; hind femur with short bristles on anteroventral surface, which are weak basally and become stout as they near the apex, the posteroventral surface with similar bristles on apical third or more, which is contrary to the general rule in *Phaonia*, where they are almost always on the basal half on this surface; hind tibia with one anteroventral and two anterodorsal bristles and a series of stout setulae on anterior and posterior surfaces Outer cross-vein very conspicuously bent inward at middle.

Female.—Similar to the male but the frons is over one-third of the head-width, and the hind femur has the posteroventral bristles less distinct.

Type.—Male, and one male *paratype*, Brownsville, Texas, November, 23, 1910, at sugar, (C. A. Hart). *Allotype* and one male *paratype*, same locality, December 17, 1910, (C. A. Hart). *Paratype*, male, Uvalde, Texas, April 4, 1916, (Bishopp, No. 5670). Type in collection of Illinois Natural History Survey.

Phaonia texensis variety **flavofemorata** new variety

Differs from the typical form in having the mid and hind femora or all femora reddish yellow, and the hypopleura bare.

It is possible that this is a distinct species, but my material is insufficient to enable me to decide.

Type.—Male, and one male *paratype*, Florida (Maynard). *Allotype*, female, Uvalde, Texas, November 1, 1915. *Paratype*, female, Uvalde, Texas, November 18, 1915, (Bishopp). All in U. S. N. M.

Phaonia limbinervis Stein

Phaonia limbinervis Stein, Ann. Nat. Mus. Hungary, XVI, p. 208, 1918.

I have before me a male and female, which agree so closely with Stein's description of this species that I can not doubt their identity with it. The species, which very closely resembles *texensis*, differs only as indicated in the key to species.

This species was originally described from Mexico, and afterwards recorded by Stein (1920) from California.

The two specimens I have examined are from Lava, New Mexico, April 11, 1898, (Cockerell), and Tempe, Arizona, March 8, 1914, (Wildermuth).

Phaonia aberrans Malloch

Phaonia aberrans Malloch, Proc. Biol. Soc. Wash., XXXII, p. 208, 1919.

This species differs from its allies in having an additional strong bristle on the posterodorsal surface of the hind tibia basad of the calcar. The apical posterodorsal bristle is as strong as the dorsal one.

Length, 9 to 10 mm.

Originally described from one male taken by W. L. McAtee at Beltsville, Maryland, I have before me the type and another male, taken at Riverton, New Jersey, April 17, 1905, which belong to the collection of the United States National Museum.

Phaonia alaskensis new species

Female.—Black, distinctly shining, head, thorax and abdomen with grayish pruinescence. Frons, when seen from above, velvety blackish brown; frontal lunule silvery white; antennae black, basal two segments yellowish; palpi yellow, broadly infuscated apically. Thorax quadrivittate. Abdomen without distinct markings, with a slight violaceous tinge. Legs including coxae reddish yellow, tarsi fuscous. Wings clear, veins brown, yellow basally. Calyptrae and halteres yellow.

Eyes indistinctly hairy; frons a little over one-third of the head-width; orbits narrow, the bristles irregular, usually two outwardly curved on upper third, some setulose hairs laterad of the bristles; parafacial at base of antennae not as wide as third antennal segment, narrowed below; cheek barely as high as width of third antennal segment, with two or three series of bristles along

lower margin; third antennal segment broad, not twice as long as second, its apex almost at mouth-margin; arista with very short pubescence, the longest hairs not longer than its basal diameter; palpi slightly broadened apically. Thorax with two or three pairs of short setulose presutural acrostichals, between which there are some hairs; postsutural dorsocentrals four; prelar short but distinct; hypopleura bare. Basal tergite bare. Fore tibia with a median posterior bristle; fore tarsus slender, longer than tibia, without long sensory hairs along posterior side of basal segment; mid femur with a fine bristle at base on ventral surface; mid tibia with two posterodorsal and one posterior or posteroventral bristle; hind femur with two or three preapical bristles on anteroventral surface; hind tibia with one anterodorsal and two anteroventral bristles. Last two sections of fourth vein subequal.

Length, 5.5 mm.

Type and three *paratypes*.—Muir's Inlet, Alaska, June 12, 1899, (T. Kincaid, Harriman Alaska Expedition). *Paratypes*, one female, Anchorage, Alaska, July 22, 1921; one female, Hurricane, Alaska, July 15 1921, and two females, Camp 297 of Alaska Engineers' Commission, 12 miles north of Hurricane, Alaska, July 14, 1921, (J. M. Aldrich). All in U. S. N. M.

Phaonia subfusca new species

Male and female.—Black, subopaque, densely gray pruinescent. Basal two segments of antennae and base of third, palpi, and the lower and anterior part of cheeks reddish yellow. Thorax inconspicuously quadrivittate. Abdomen with a linear black dorsocentral vitta. Legs fuscous, apices of femora and all of tibiae reddish yellow. Wings clear, cross-veins not noticeably infuscated. Calyptrae yellowish white. Halteres yellow.

Male.—Eyes almost bare, separated by a distance about equal to twice the width of third antennal segment; orbits narrow, setulose nearly to anterior ocellus; interfrontalia not interrupted; profile as in figure 16. Thorax with three pairs of postsutural dorsocentrals; prealar very long; hypopleura hairy on upper margin in front of spiracle. Abdomen narrowly ovate, basal sternite bare, fifth with a deep posterior excision. Fore tibia with a posterior median bristle; fore tarsus slender, longer than tibia, without sensory hairs except at apices of segments; mid femur with about four bristles on basal half of posteroventral surface; mid tibia with two or three posterior bristles; hind femur with a series of long strong bristles on apical half of anteroventral surface, and many long setulose hairs on basal half of ventral surfaces; hind tibia with three or four anteroventral setulae, which are weaker than the series of anterior setulae, the anterodorsal surface with from two to five unequal bristles, a weak bristle basad of ealcar and a series of fine erect hairs on middle of posterior surface, the apex with the three dorsal bristles equal (fig. 23). Costal thorn long.

Female.—Differs from the male in having the frons over one-third of the head-width, and the hind femora and tibiae with fewer hairs.

Length, 7.5 to 8 mm.

Type.—Male, *allotype*, female, and three male and four female *paratypes*, Pulaski, Illinois, July 2, 1910, taken in a meadow, (C. A. Hart). *Paratypes*, one female, Vinton, Ohio; one female, Columbus, Ohio, (J. S. Hine). All in collection of Illinois Natural History Survey.

Phaonia nigricauda Malloch

Phaonia nigricauda Malloch, Trans. Amer. Ent. Soc., XLIV, p. 268, 1918.

This species has the eyes of the male more widely separated than does any other of the *apicata* group except *pallida* Stein. The orbits are setulose to anterior ocellus, and the abdomen of the male is narrow and subcylindrical, almost as in *pallida*.

I have seen this species only from California—Berkeley, Santa Cruz, and Redwood Canyon.

Phaonia flava Stein

Phaonia flava Stein, Arch. für Naturges., 1918, abt. A, heft 9, p. 6, 1920.

This species closely resembles the foregoing in habitus, size, and color, differing most noticeably in the color of the head. Profile of head as in figure 14.

I have no males of *flava* for comparison of this sex with that of *nigricauda*.

Length, 6 mm.

Stein had, I believe, two species confused in his material when he described *flava*, the specimens from California being *nigricauda* and the others, from Washington, what we may justifiably accept as *flava*. I take this view because I do not believe that, if my surmise is correct and he really had two species confused, I am entitled to sink his species as a synonym of *nigricauda* and rename the specimens which are evidently different. It is evident that the description was very largely drawn from a Californian male, but the first locality mentioned is Friday Harbor, Washington, where *nigricauda* so far as I know does not occur.

I have a number of females of *flava*, as here limited, from Washington state: Tacoma, Mount Constitution, Chatcolet, Piedemont, and Friday Harbor; and one from Forest Grove, Oregon.

Phaonia pallida (Stein)

Dialyta pallida Stein, Arch. für Naturges., abt. A, heft 9, p. 22, 1920.

This species, though having the eyes of the male widely separated and some of the characters and general habitus of a *Dialyta*, is really an aberrant *Phaonia* (fig. 15). Stein recognises the similarity of the species and *flava* in his notes on the former. The genus *Dialyta* is not easily separable from *Phaonia*, but the legs in the former are more strongly bristled, and in both the American species known to me there are bristles on the anterodorsal surfaces of the fore and mid tibiae, and the apical tibial bristles are very long and numerous.

Stein described *pallida* from a male taken at Julietta, Idaho. The similarity between the species would have been more striking to Stein, had he considered the male of *flava*, with wide frons, as normal instead of aberrant. Evidently the frons in the male of *flava* is about as wide as in *pallida*, and but little darker than in the latter species, judging from Stein's remarks under *flava*.

I have specimens of *pallida* from the following localities: two males and one female, Almota, one female, Union Flat, one female, Pullman, one female, North Yakima, all from Washington; one female, Hood River, Oregon; three females, Mono Lake, California. All the above were sent to me by Dr. Aldrich.

Phaonia flavibasis Malloch

Phaonia flavibasis Malloch, Proc. Biol. Soc. Wash., xxxii, p. 208, 1919.

Since describing this species I have seen another male, from Hanover, New Hampshire.

Structurally the species very closely resembles *bysia* Walker, but the prealar bristle is much shorter and the basal half of the abdomen is conspicuously subpellucid yellow.

There are several species belonging to this same group, all of which are very closely related, *bysia* Walker, *apicata* Johannsen, *apta* Stein and *winnemanae* Malloch.

Phaonia curvinervis new species

Female.—Shining black, with distinct gray pruinescence. Antennae and palpi rufous yellow, third segment of former brown except at base. Thorax quadrivittate, margins of humeri, posterolateral margins of mesonotum, scu-

tellum and margins of pleural sclerites yellowish. Abdomen with an indistinct dorsocentral vitta and lateral checkerings black. Legs including coxae yellow, tarsi slightly infuscated. Wings clear, veins basally, and calyptrae and halteres yellow.

Eyes almost bare; frons at vertex about one-third of the head-width; slightly wider anteriorly; orbits narrow, the bristles strong, few hairs adjacent to the bristles; parafacials narrow; cheek about as high as width of third antennal segment; third antennal segment twice as long as second; longest hairs on arista distinctly longer than width of third antennal segment. Thorax without distinct presutural acrostichals; postsutural dorsocentrals three; prealar almost as long as the bristle behind it; anterior intra-alar very strong. Fore tibia with two anterodorsal and two posterior bristles; fore tarsus slender, longer than tibia, basal segment with some rather long sensory hairs along posterior side; mid tibia with four or five bristles of unequal lengths on posterior side in an irregular series; hind femur with a complete series of sparse bristles on anteroventral surface, and some fine bristles on basal half of posteroventral; hind tibia with two anterodorsal and four or five anteroventral bristles, the apical posterodorsal bristle small but distinct. Fourth wing-vein slightly but distinctly curved forward apically (fig. 21).

Length, 8.5 mm.

Type.—New London, Connecticut, July 10, 1916, (R. C. Osborn), [Ohio State University].

Phaonia solitaria Stein

Phaonia solitaria Stein, Arch. für Naturges., 1918, abt. A, heft, 9, p. 15, 1920.

This species, which I have not seen, is closely related to the following two. Johannsen in describing *apicata* placed it in the subgenus *Euphemia*, because some specimens had a more or less distinct pair of presutural acrostichal bristles. Stein separates *solitaria* from the other species which he has keyed by the presence of these bristles, *solitaria* having a pair present and the others lacking them. His specimens of *solitaria* included one from Ithaca, probably sent from Cornell, and as Johannsen described *apicata* from that locality I believe I am right in assuming that *solitaria* is merely a variant of the former.

I have a male sent to me by Dr. Aldrich, and taken at Petersham, Massachusetts, which has, besides a distinct pair of presutural acrostichals, four dorsocentrals at least on one side; the other side is damaged by the pin so that it is impossible to say how many there are. I believe this specimen is merely a variant of *apicata*.

Phaonia apicata Johannsen

Phaonia apicata Johannsen, Trans. Amer. Ent. Soc., XLII, p. 396, 1916.
Phaonia pallicornis Stein, Arch, für Naturges., 1918, abt. A, heft 9, p. 12, 1920.

This species is common in the northeastern United States and extends into Canada. I have grave doubts as to its being distinct from *bysia* Walker.

I have before me specimens from Mt. Equinox, Vermont; Bretton Woods, New Hampshire; New Bedford, Massachusetts; Homestead, Iowa, and Youghall, New Brunswick, Canada.

Phaonia bysia Walker

Anthomyia bysia Walker, List Dipt. Ins. Brit. Mus., pt. 4, p. 936, 1849.

This species and the last very closely resemble *Mydaea occidentalis* Malloch in habitus and color, and are often confused with it in collections. Lack of sufficient material of this form prevents me from attempting to decide whether or not they are distinct species.

I have seen *bysia* only from North Adams, Massachusetts, and Glen House, New Hampshire, (C. W. Johnson).

Phaonia winnemanae Malloch

Phaonia winnemanae Malloch, Proc. Biol. Soc. Wash., XXXII, p. 3, 1919.

This species closely resembles *apicata*, but has the humeri, posterior lateral margins of mesonotum and tarsi yellow. The eyes are separated by more than the width across posterior ocelli, the prealar bristle is very long, the hind femora have some weak bristles on the basal half of posteroventral surface, while the hind tibia has two or three anterodorsal, and four or five anteroventral bristles, and four or five long setulae on the anterior surface, as well as some shorter setulae on posterior surface.

Length, 7 mm.

Originally described from Plummer's Island, Maryland.

Phaonia parviceps Malloch

Phaonia parviceps Malloch, Trans. Amer. Ent. Soc., XLIV, p. 267, 1918.
Phaonia caesia Stein, Arch. für Naturges., 1918, abt. A, heft 9, p. 4, 1920.

This species was originally described from one female. I am now able to present the description of the male.

Male.—Similar in color to the female, the dorsocentral vitta on abdomen more distinct.

Eyes very sparsely hairy, separated at narrowest part of frons by a distance equal to width of third antennal segment; orbits contiguous above middle, to which point they are setulose (fig. 13). Abdomen narrowly ovate, basal sternite bare. Fore tibia without a posterior bristle; the anterodorsal setulae small but distinct; fore tarsus slender, without long sensory hairs along the posterior side of basal segment; posteroventral surface of hind femur with short irregular setulose hairs.

Allotype, and one male and one female; San Antonio Canyon, Ontario, California, July 25, 1907, (J. S. Hine). One female, Claremont, California, in mountains, (Baker), [U. S. N. M.].

Phaonia trivialis new species

Male.—Black, shining. Head conspicuously grayish pruinescent, antennae and palpi black. Thorax quadrivittate, with faint grayish pruinescence. Abdomen densely gray pruinescent, with a poorly defined dorsocentral vitta, which tapers from base to apex and nearly disappears before tip, the bases of the bristles and hairs with a black dot surrounding each. Legs black. Wings clear, infuscated at bases and with a faint infuscation on cross-veins. Calyptrae and halteres yellow.

Eyes hairy; frons rather broad, wider than distance across posterior ocelli; orbits narrow, either about one-third as wide as interfrontalia, bristled on entire length; parafacial at base of antennae not as wide as third antennal segment, narrowed below; face concave in middle; cheek not twice as high as widest part of parafacial, with bristles on lower half; third antennal segment about twice as long as second; longest hairs on arista distinctly shorter than width of third antennal segment. Thorax with two or three pairs of irregularly arranged presutural acrostichals, which are not conspicuously differentiated from the long adjoining hairs; postsutural dorsocentrals three; prealar bristle fine but long. Abdomen short ovate, basal sternite bare, fifth with a broad shallow posterior emargination. Fore tibia without a median posterior bristle; fore tarsus slender, longer than tibia, with a fine sensory hair at base of basal segment and at apices of other segments on anterior and posterior sides; mid femur with a series of weak posteroventral bristles which are longest at middle; mid tibia with one posterior bristle basad of middle; hind femur with the anteroventral bristles almost absent basally, long on apical half, the posteroventral surface with some short bristles on basal half; hind tibia with two anterodorsal and four anteroventral bristles. Outer cross-vein curved; veins three and four distinctly divergent apically.

Length, 5 mm.

Type.—Banff, Alberta, Canada, [Illinois State Natural History Survey].

Phaonia laticornis new species

Male and female.—Black, distinctly shining, with moderately dense gray pruinescence. Head entirely black, orbits, parafacials, and cheeks with whitish pruinescence. Thorax with four black vittae. Abdomen with a series of poorly defined dorsocentral spots and lateral checkerings black. Legs testaceous yellow, tarsi black, femora darker than tibiae, at least the fore pair and sometimes all pairs infuscated. Wings clear. Calyptrae yellowish white. Halteres yellow.

Male.—Eyes almost bare; narrowest part of frons about one-fifth of the head-width; orbits narrow, each with about seven long bristles, the upper one opposite anterior ocellus, and in addition to the bristles numerous setulose hairs; third antennal segment about three times as long as broad, extending almost to mouth-margin; arista with its longest hairs about twice as long as its basal diameter; parafacial over half as wide at base of antennae as width of third antennal segment, becoming almost linear below; cheek nearly as high as width of third antennal segment. Thorax with the presutural acrostichal hairs long but not setulose; prealar long; postsutural dorsocentrals three; hypopleura bare. Abdomen ovate, basal sternite bare, fifth cleft. Fore tibia with two posterior bristles; hind femur with some erect hairs at base ventrally and two preapical anteroventral bristles; hind tibia with two anterodorsal and two anteroventral bristles.

Length, 6.5 to 7.5 mm.

(S. A. Shaw), [Illinois State Natural History Survey]. *Allotype*, female, Cedar Lake, Illinois, August 6, 1906, (C. A. Hart). *Paratypes*, females, Oconto, Wisconsin, August 1, 1920, (T. H. Frison); Dummerston, Vermont, July 14, 1908, (C. W. Johnson); Virginia, no other data, [U. S. N. M.].

Phaonia atlanis new species

Male.—Black, subopaque, densely gray pruinescent. Orbits, parafacials, and cheeks white pruinescent; basal two antennal segments brownish yellow, third black; palpi fuscous. Thorax with four fuscous vittae on anterior half, the median pair most distinct. Abdomen with a dorsocentral fuscous vitta which is more or less triangularly dilated on each segment. Legs yellow, all femora more or less infuscated, the fore pair most distinctly so, tarsi fuscous; Wings clear, cross-veins narrowly but distinctly infuscated. Calyptrae whitish. Halteres yellow.

Eyes almost bare, separated at narrowest part of frons by a distance about twice as great as width of third antennal segment; orbits with bristles almost to level of anterior ocellus; interfrontalia distinct on its entire length, at its narrowest part wider than one orbit at that part; parafacial not as wide as third antennal segment; cheek higher than width of third antennal segments; longest hairs on arista longer than width of third antennal segment. Thorax with two or three series of fine hairs between the presutural parts of the

submedian vittae; prealar long; postsutural dorsocentrals three. Abdomen narrow, almost subcylindrical, basal sternite bare, fifth with a broad deep posterior excision. Fore tibia with a median posterior bristle; fore tarsus slender, longer than tibia, without long sensory hairs on posterior surface of basal segment; mid femur with one bristle near base on posteroventral surface; mid tibia with two or three posterior bristles; hind femur with some weak bristles on anteroventral surface, only the apical one long; hind tibia with one anterodorsal and one long and one or two short anteroventral bristles and a few short posterior setulae, the calcar at least one-third of the tibial length from apex, all three dorsal apical bristles long (fig. 22).

Length, 5 to 5.5 mm.

Type.—Riverton, New Jersey, April 20, (C. W. Johnson), [Boston Society of Natural History]. Two male *paratypes*, Riverton, New Jersey, August 17, (C. W. Johnson), and Falls Church, Virginia, April 23, (N. Banks).

The paratypes have the femora much paler than does the type.

Phaonia fusca (Stein)

Spilogaster fusca Stein, Berl. ent. Zeitschr., 1897, p. 189.

This species is one of the commonest and one of the most variable of the genus occurring in this country. In most specimens there are one or two weak hairs at base of third wing-vein on the under surface, a character which if invariably present would readily separate it from its allies. There are but few species which possess this character, though *atlanis* does. There are also usually one or two fine hairs adjacent to the base of the posterior notopleural bristle and the bristle at apex of posterodorsal surface of hind tibia is very much weaker than the dorsal and anterodorsal bristles, facts which show its relationship with the *errans* group, rather than with those with which it falls in the key, though like them it has only three pairs of postsutural dorsocentrals. Profile of head as in figure 17.

There are no species known to me from North America with which this species can readily be confused, except those with which it is compared in the key.

I have taken the species commonly on tree-trunks along the margins of woods in Illinois from May to August, and have seen many specimens from other states, including Ohio, Virginia, New York, New Jersey and New Hampshire.

Phaonia diruta (Stein)

Spiligaster diruta Stein, Berl. ent. Zeitschr., 1897, p. 188.

I have before me, besides the defective type male, several specimens of both sexes of this species. It superficially resembles *fusca*, but is much smaller. The cross-veins of the wings are not noticeably infuscated and the structural differences pointed out in the key to species will serve to distinguish it from its closest allies.

Length, 5 to 6.5 mm.

The type was taken at Manayunk, Pennsylvania. Specimens before me are from Cumberland County, New Jersey and Lafayette, Indiana.

Phaonia prisca Stein

Phaonia prisca Stein, Arch. für Naturges., 1918, abt. A, heft 9, p. 14, 1920.

Male.—Black, slightly shining, densely gray pruinescent. Orbits, face, cheeks, and parafacials with silvery tomentum; antennae yellow, third segment brownish fuscous; palpi fuscous. Thorax rather indistinctly vittate. Abdomen with a linear dorsocentral black vitta, fifth sternite largely yellowish. Legs entirely yellow, tarsi slightly darkened. Wings hyaline, veins yellow. Calyptrae and halteres yellow.

Eyes almost bare; narrowest part of frons a little wider than distance across posterior ocelli; orbits broad, obscuring the interfrontalia for the greater part of its length, bristles only on the anterior half; parafacial at base of antennae as wide as third antennal segment, slightly narrowed below; cheek a little less than twice as high as widest part of parafacial with a series of rather widely spaced long bristles along the lower margin, some hairs above them posteriorly and two bristles anteriorly which are upwardly curved (fig. 18); third antennal segment about twice as long as second; arista with its longest hairs about as long as width of third antennal segment; palpi normal. Thorax without distinct presutural acrostichals, the hairs sparse; postsutural dorsocentrals three; prealar over half as long as the bristle behind it; hypopleura bare. Abdomen ovate; basal sternite bare. Fore tibia without a median posterior bristle; fore tarsus a little longer than tibia, without long sensory hairs along posterior side of basal segment; mid femur with four or five long bristles on basal half of posteroventral surface; mid tibia with four or five posterior bristles which are not equal in length; hind femur with an almost complete series of anteroventral and posteroventral bristles, those of the latter series weak apically; hind tibia with one anterodorsal and three or four anteroventral bristles, the anterior and posterior surfaces with some erect setulae. Outer cross-vein slightly curved.

Length, 7 mm.

Originally described from one male from Ithaca, New York. I have before me a male from the same locality.

List of Stein Species Unknown to Author

The types of the following species will finally be deposited in the United States National Museum, but they have not yet been delivered to its care, so that it is impossible to authentically identify them.

apta. Similar to *apicata* Johannsen, differing only, to judge from the description, in having the prealar bristle long and the arista long plumose. Wisconsin and New York. Probably a synonym of *apicata.*

inculta. Described from one female. Related to *apicata.* South Dakota.

Explanation of Figures

Fig. 1.—Head of *Neomuscina tripunctata* Van der Wulp.
Fig. 2.—Head of *Charadrella macrosoma* Van der Wulp.
Fig. 3.—Head of *Neomusca obscura* Van der Wulp.
Fig. 4.—Head of *Pseudophaonia orichalcea* Stein.
Fig. 5.—Head of *Pseudophaonia griseocaerulea* new species.
Fig. 6.—Head of *Dendrophaonia querceti* Bouché.
Fig. 7.—Head of *Dendrophaonia hilariformis* Stein.
Fig. 8.—Head of *Phaonia protuberans* new species.
Fig. 9.—Head of *Phaonia serva* Fallen.
Fig. 10.—Head of *Phaonia fusciscquama* Van der Wulp.
Fig. 11.—Head of *Phaonia harti* new species.
Fig. 12.—Head of *Phaonia striata* Stein.
Fig. 13.—Head of *Phaonia parviceps* Malloch.
Fig. 14.—Head of *Phaonia flava* Stein.
Fig. 15.—Head of *Phaonia pallida* Stein.
Fig. 16.—Head of *Phaonia subfusca* new species.
Fig. 17.—Head of *Phaonia fusca* Stein.
Fig. 18.—Head of *Phaonia prisca* Stein.
Fig. 19.—Hind femur and tibia of *Dendrophaonia hilariformis* Stein, male.[5]
Fig. 20.—Hind femur and tibia of *Dendrophaonia querceti* Bouché, male.
Fig. 21.—Apex of wing of *Phaonia curvinervis* new species.
Fig. 22.—Hind femur and tibia of *Phaonia atlanis* new species, male.
Fig. 23.—Hind femur and tibia of *Phaonia subfusca* new species, male.
Fig. 24.—Hind femur and tibia of *Phaonia delcta* Stein, male.

[5] Cal = Calcar; Ad = Apical dorsal; Apd = Apical posterodorsal.